Cadillac

Service Manager's

Personal Copy

1973 Shop Manual

1973 CADILLAC SHOP MANUAL ALL SERIES

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended by Cadillac and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that some warnings against the use of specific service methods that can damage the vehicle or render it unsafe are stated in this service manual. It is also important to understand these warnings are not exhaustive. Cadillac could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Cadillac has not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Cadillac must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects.

1973 CADILLAC SHOP MANUAL

Service information pertaining to features exclusive to the Eldorado is provided at the back of the individual sections in this manual. All other service information for the Eldorado is the same as that described in the forward portion of the individual sections.

All information, illustrations, and specifications contained in this manual are based on the latest product information available at the time of publication approval. The right is reserved to make changes at any time without notice.

Service Department
CADILLAC MOTOR CAR DIVISION
General Motors Corporation
Detroit, Michigan 48232

Printed in U.S.A. 9-72
Part No. 109 9635

THE CADILLAC CERTIFIED CRAFTSMAN'S LEAGUE

CERTIFIED CRAFTSMAN

CADILLAC CRAFTSMAN CODE

I HEREBY pledge myself in all my work on Cadillac cars, to be thorough and exact in diagnosing trouble; to recommend only that service which is to the best interest of the owner; to perform that work for which I am responsible in accordance with Cadillac standards to the best of my ability, and in all my dealings with Cadillac owners, to be courteous, honest, and ethical; and to do everything within my power to further the owner's satisfaction and promote his good will to Cadillac and to my dealer.

The Cadillac Certified Craftsman's League is a program sponsored by Cadillac Motor Car Division for the benefit of authorized dealer's service departments. Participation in the League is open to Cadillac servicemen and partsmen, including department managers and apprentices. Enrollment information is available from the Zone Service Representative.

GENERAL INFORMATION, MAINTENANCE AND LUBRICATION

Foreword

This Shop Manual has been prepared by the Service Department of the Cadillac Motor Car Division to aid in servicing 1973 model Cadillac automobiles. It is intended primarily for servicemen who are familiar with earlier model Cadillacs. It includes complete information on service procedures and specifications pertaining to all 1973 Cadillac cars except body service information which is covered in a separate manual. Refer to the body service manual for servicing Cadillac body items.

Arrangement of the Manual

The title page contains a rapid reference section index with headings corresponding to the page tabs at the beginning of each section. A Table of Contents is provided at the beginning of each section that contains more than one major subject. A complete alphabetical index is located at the back of the manual. The section sequence used in this manual has been arranged to conform with the Shop Manuals of other GM car lines.

The individual sections include theory of operation and diagnosis at the beginning of each section followed by service adjustments and replacement procedures. An illustrated list of special tools, a torque requirement chart, and specifications are provided at the end of each section.

Service information pertaining only to those features that are exclusive to the Eldorado is provided at the back of the individual sections in the manual. For Eldorado service procedures and recommendations not listed, refer to the forward part of the appropriate section, as these service procedures are similar to those on other 1973 Cadillac cars.

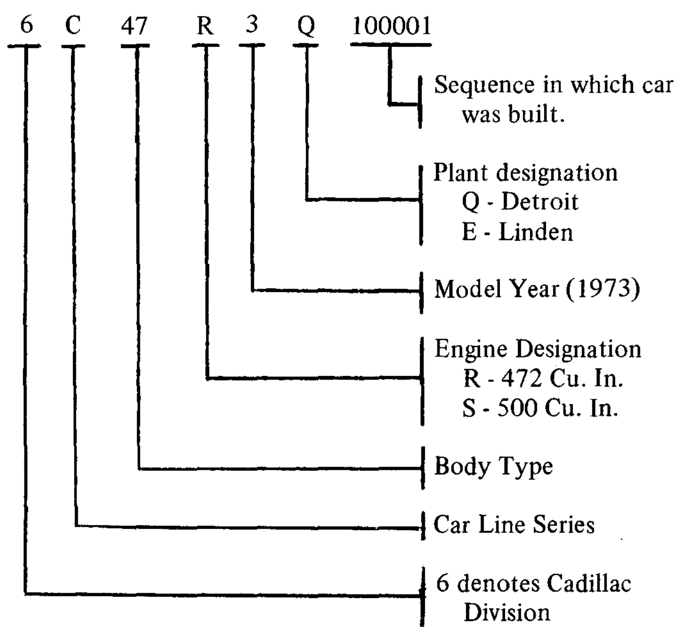
GENERAL INFORMATION

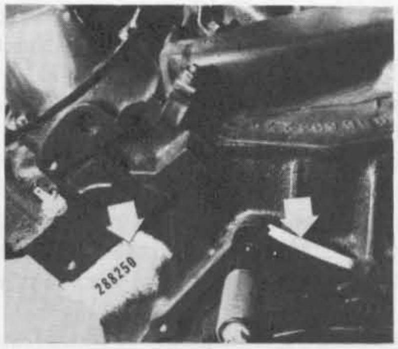
Vehicle Identification Number

Each 1973 Cadillac automobile or Commercial Chassis carries a 13-digit vehicle identification number used for license and insurance identification and in general reference to the automobile. The number is located on the forward lower edge of the windshield trim molding at the driver's side of the car where it is visible through the windshield. The 1973 Cadillac vehicle identification number is decoded as follows:

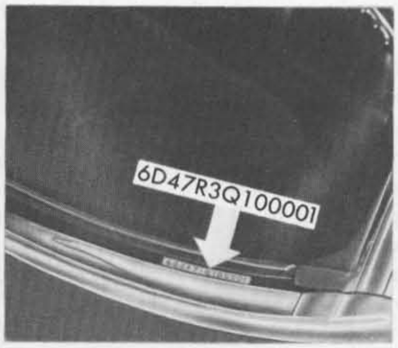
The last six digits of the number determine the sequence in which the car was built. These numbers are utilized as follows:

100001 through 350000 - Detroit built "C" bodies
350001 through 400000 - Linden built DeVille series
400001 through 450000 - Detroit built "E" bodies

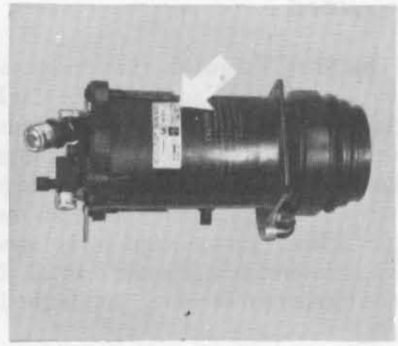




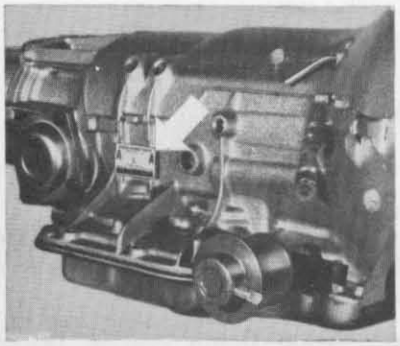
ENGINE UNIT NUMBER ON BLOCK BEHIND LEFT CYLINDER HEAD; V.I.N. DERIVATIVE ON BLOCK BEHIND INTAKE MANIFOLD



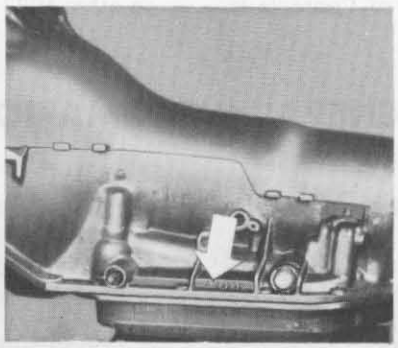
VEHICLE IDENTIFICATION NUMBER LOCATED ON PLATE RIVETED TO COWL BAR IN THE LOWER LEFT HAND CORNER OF THE WINDSHIELD.



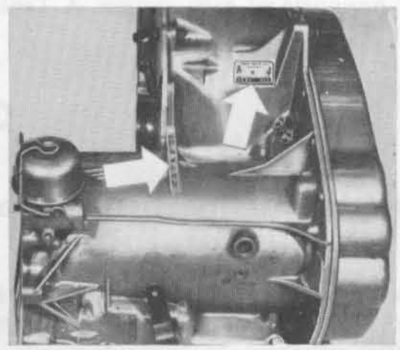
A/C COMPRESSOR SERIAL NUMBER LABEL LOCATED ON REAR PORTION OF COMPRESSOR HOUSING.



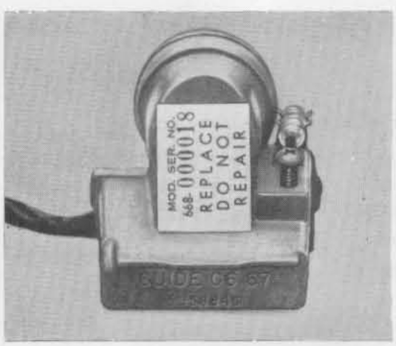
TURBO HYDRA-MATIC TRANSMISSION UNIT NUMBER PLATE LOCATED ON RIGHT SIDE OF CASE (EXCEPT 6L)



VEHICLE IDENTIFICATION NUMBER DERIVATIVE LOCATED ON LEFT SIDE OF TRANSMISSION CASE (EXCEPT 6L)

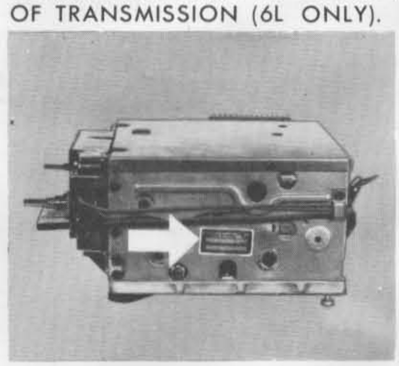


TURBO HYDRA-MATIC TRANSMISSION UNIT NUMBER PLATE LOCATED ON LEFT SIDE OF CONVERTER HOUSING. VEHICLE IDENTIFICATION NUMBER DERIVATIVE LOCATED ON VERTICAL SUPPORT PAD ON LEFT OF TRANSMISSION (6L ONLY).



GUIDE-MATIC PHOTOCELL AND AMPLIFIER SERIAL NUMBER LABEL LOCATED ON BACK OF UNIT.

TWILIGHT SENTINEL AMPLIFIER SERIAL NUMBER LABEL LOCATED ON COVER OF UNIT.



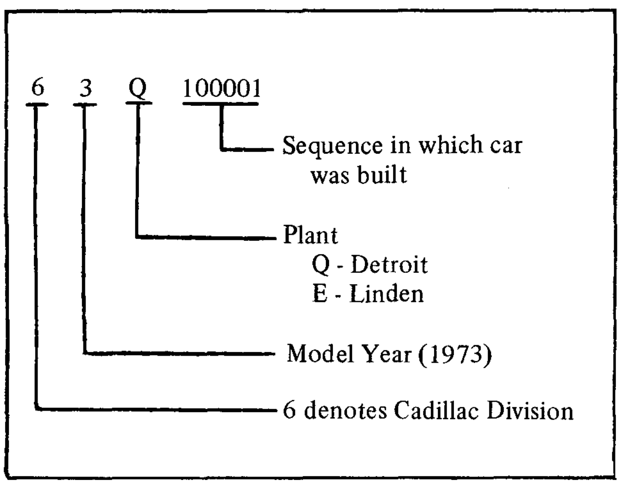
RADIO SERIAL NUMBER TAG LOCATED ON RIGHT SIDE OF TUNER.

Fig. 0-1 Unit Number Location

MODEL NAME	PARTS AND FLAT RATE MANUAL BODY STYLE	V.I. BODY STYLES
Calais Coupe	6CC47	6C47
Calais Sedan	6CC49	6C49
Coupe DeVille	6CD47	6D47
Sedan DeVille	6CD49	6D49
Fleetwood Sixty Special Brougham	6CB69	6B69
Fleetwood Seventy-Five Sedan	6DF23	6F23
Fleetwood Seventy-Five Limousine	6DF33	6F33
Eldorado Coupe	6EL47	6L47
Eldorado Convertible	6EL67	6L67
Commercial Chassis	6ZZ90	6Z90

The series and model section (2nd, 3rd, and 4th digits) of the vehicle identification number may be further decoded using the above chart. These two body style numbers are interchangeable when referring to the automobile.

A nine-digit derivative of the vehicle identification number is applied to the engine and transmission at the locations shown in Fig. 0-1. This derivative is used for in-plant control of these assemblies and may be used by law enforcement or other officials to identify proper engine-chassis combinations. This number should contain the same numbers and letters as the vehicle identification number but in the condensed form shown below.



Identification Numbers

Locations of identification numbers on various units are shown in Fig. 0-1. The identification number on the unit should always appear on product report forms sent to the Central Office such as PIR's, Claim Tags, Pre-Delivery Reports and, when required, on Warranty Claims. The 13 digit Vehicle Identification Number is necessary when reporting product information on any vehicle.

Body Name Plate

A body name plate, Fig. 0-2, is attached to the top surface of the shroud on the right side, under the hood, near the cowl. The name plate carries the style number, trim number, body number, and paint number in the areas indicated by ST, TR, BODY, and PAINT.

The first two digits of the style number (ST) indicate the model year while the remaining five digits indicate the body style.

The numbers following TR indicate the interior trim color and seat type.

The body number consists of three letters indicating the assembly plant and six digits indicating the sequence in which the body was built.

The first two digits of the paint number indicate color of the body shell and chassis sheet metal; the letter indicates color of convertible and vinyl tops.

The number-letter code at the left below trim indicates date of assembly (month-week).

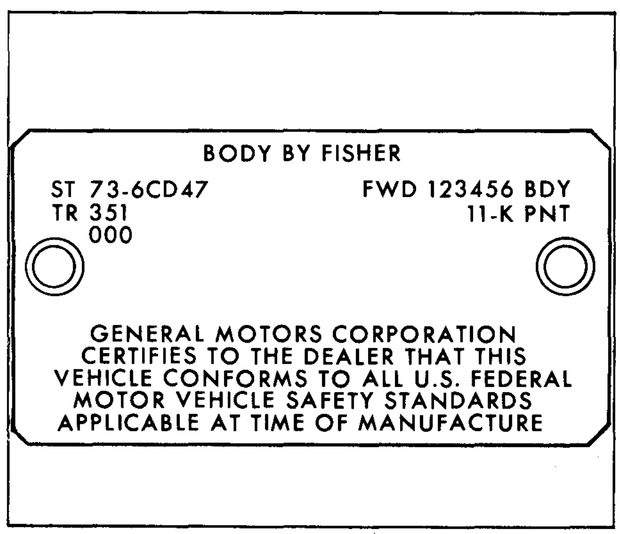


Fig. 0-2 Body Name Plate

GENERAL DESCRIPTION AND SPECIFICATIONS

Description	Vehicle Identification Number	WEIGHT	Wheelbase (Inches)	Overall Length (Inches)	Overall Height (Inches)	Maximum Width (Inches)	Tread Width Front	Tread Width Rear
Fleetwood Sixty Special Brougham	6B69	4999	133.0	231.5	55.5	79.8	63.3	63.3
Calais Sedan	6C49	4850	130.0	228.5	54.6	79.8	63.3	63.3
Calais Coupe	6C47	4797	130.0	228.5	54.1	79.8	63.3	63.3
Sedan de Ville	6D49	4882	130.0	228.5	54.6	79.8	63.3	63.3
Coupe de Ville	6D47	4822	130.0	228.5	54.1	79.8	63.3	63.3
Eldorado Coupe	6L47	4777	126.3	222.0	53.9	79.8	63.66	63.59
Eldorado Convertible	6L67	4863	126.3	222.0	54.3	79.8	63.66	63.59
Fleetwood Seventy-Five Sedan	6F23	5637	151.5	250.0	57.8	79.8	63.3	63.3
Fleetwood Seventy-Five Limousine	6F33	5759	151.5	250.0	57.7	79.8	63.3	63.3
Commercial Chassis	6Z90		157.5	253.9	—	—	63.3	65.0

Hoist Recommendations (Except Eldorado)

CAUTION: Failure to follow the recommendations outlined below may result in unsatisfactory vehicle performance, or a durability failure which may result in loss of control of the vehicle.

The preferred type of hoist for lifting 1973 Cadillacs is one that engages the front suspension and rear axle, or all four wheels.

The front lower suspension arm is designed with a flattened portion on the flange of the arm for use with lifting equipment that engages the suspension system. When using lifting equipment of this type, make certain that the car is properly centered over the hoist and that the hoist arms are positioned under the flattened portion of the flange, Fig. 0-3, outboard of the safety locaters. If the hoist arms are not properly positioned in relation to the lower support arms, damage to the steering linkage or brake lines could result, or the car may shift on the hoist.

CAUTION: The rear lower control arms should never be used as a lift point.

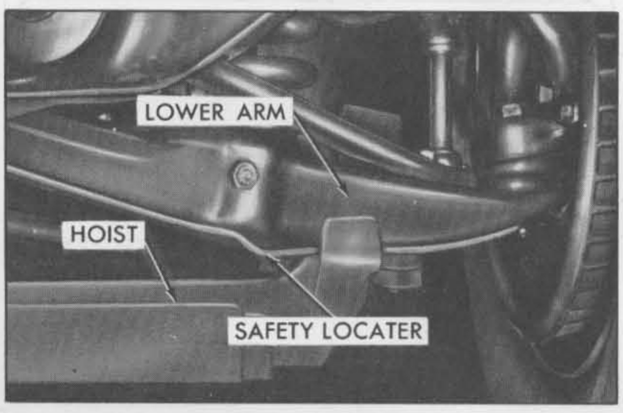


Fig. 0-3 Front Hoist Saddle Position-Except Eldorado

If a frame-engaging hoist is used, certain precautions must be observed. The shaded areas of the frame, Fig. 0-4, indicate the only acceptable positions for lift pads. Pads must be used in these areas with maximum surface contact and must contact only those parts of the frame indicated.

(NOTE: Certain cars are equipped at these locations with special brackets used for rail shipment. If such a situation is encountered, be sure to engage bracket fully rather than at the edges.)

Do not use a frame-engaging hoist to raise the Fleetwood Seventy-Five Sedan and Limousine or the Commercial Chassis.

CAUTION: The shock absorbers act as rebound stops for the rear suspension. Under no circumstances should the rear end of car be raised so that rear suspension is in rebound position while disconnecting shock absorbers.

Hoist Recommendations (Eldorado Only)

CAUTION: Failure to follow the recommendations outlined below may result in unsatisfactory vehicle performance, or a durability failure which may result in loss of control of the vehicle.

The preferred type of hoist for lifting the 1973 Eldorado is one that engages the front suspension and rear axle or all four wheels.

Use of a suspension-engaging hoist requires that certain procedures be observed.

Be sure front hoist saddle adapters engage lower suspension arm just inboard of stabilizer linkage (both sides), Fig. 0-5, to prevent damage to steering linkage. At the rear, Fig. 0-6, place "saddles" of hoist in maximum "in" position to prevent damage to Automatic Level Control overtravel lever bracket, fuel lines, and brake lines.

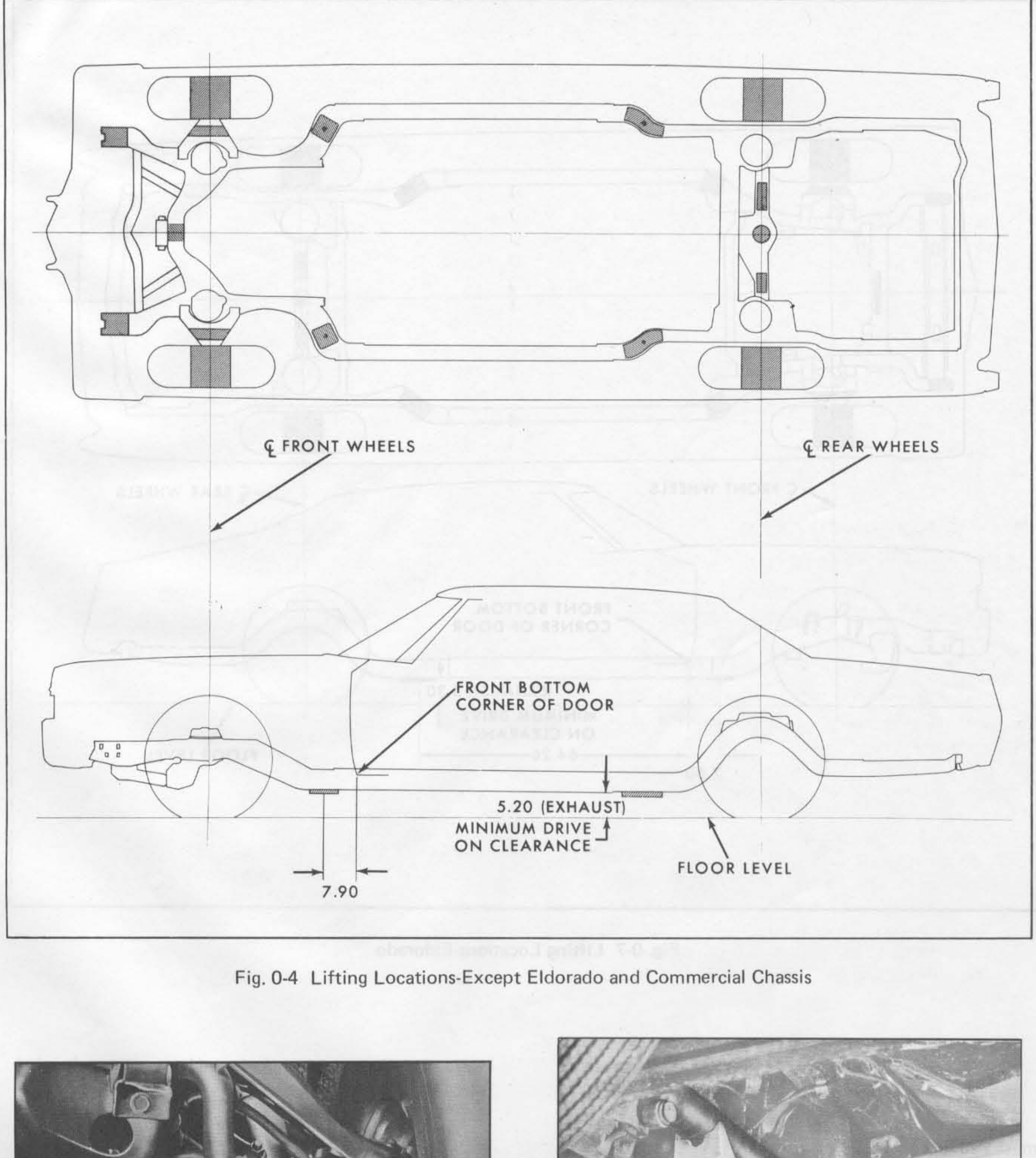


Fig. 0-4 Lifting Locations-Except Eldorado and Commercial Chassis

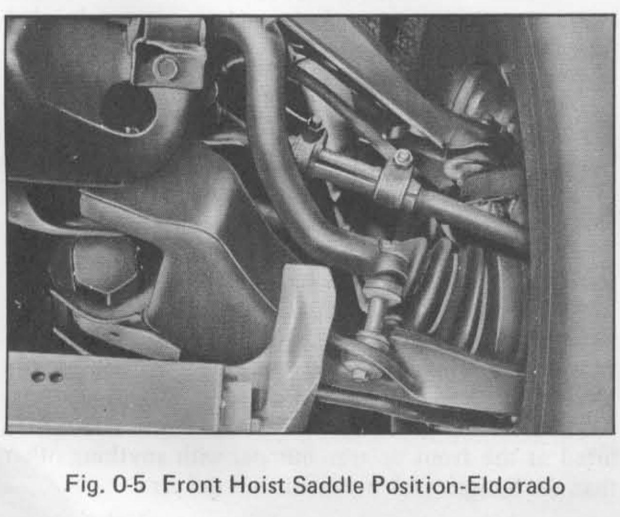


Fig. 0-5 Front Hoist Saddle Position-Eldorado

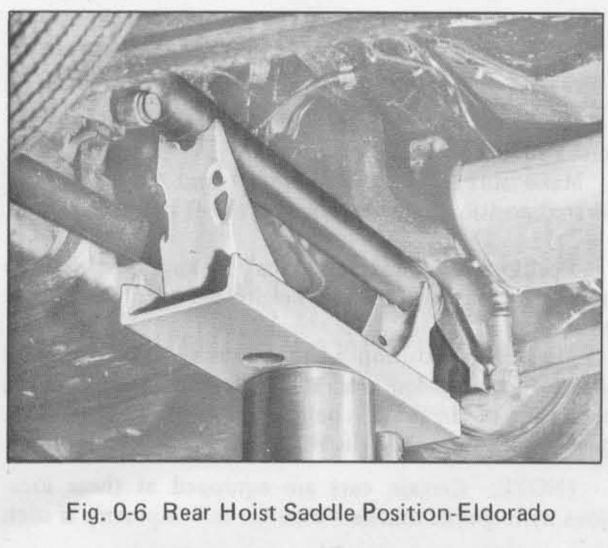


Fig. 0-6 Rear Hoist Saddle Position-Eldorado

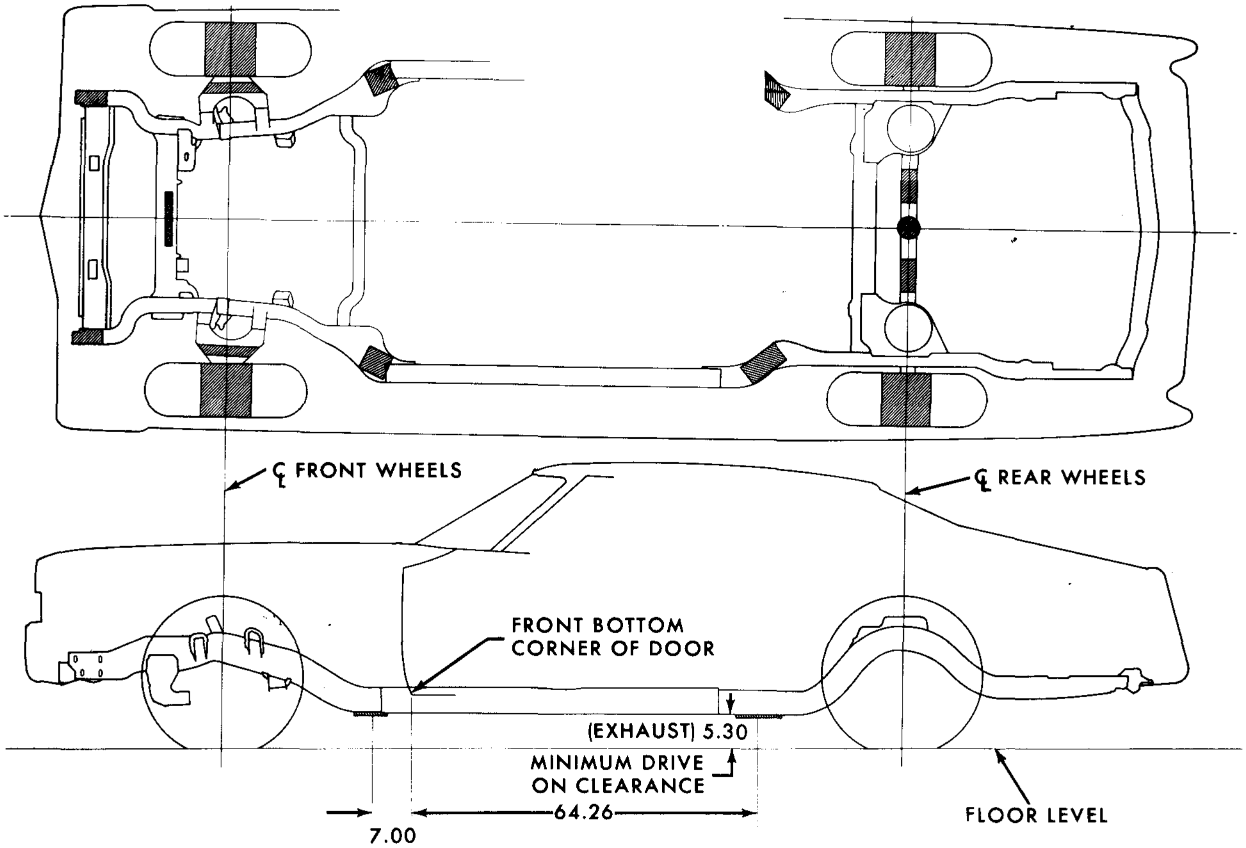


Fig. 0-7 Lifting Locations-Eldorado

CAUTION: The rear lower control arm should never be used as a lift point.

If a frame engaging hoist is used, certain precautions must also be observed.

Make sure that hoist adapters and "tabs" are in lowered position before driving on or off the lift.

Position hoist adapter "tabs" in raised position to obtain maximum possible height between frame and hoist.

Be sure to position adapter tabs in exact locations shown in the shaded areas of Fig. 0-7 and make sure the centerline of the door is behind the centerline of the lift post for proper weight distribution.

(NOTE: Certain cars are equipped at these locations with special brackets used for rail shipment. If such a situation is encountered, be sure to engage bracket fully rather than at the edges.)

An additional precaution of using two floor stands under the front frame cross member of the Eldorado is recommended when heavy mechanical operations are to be performed. Be sure to remove these stands before attempting to lower the vehicle.

If a drive-on hoist is used, be sure the center line relationship as stated above is also applied, Fig. 0-7.

When supporting the Eldorado with a floor jack or jack stands, the supports should be placed at the suspension lift points or the frame contact lift points. The Eldorado should never be supported at the extreme ends of the frame or at the center of the frame side rail or lifted at the front or rear bumper with anything other than the bumper jack provided with the car.

SERVICE INFORMATION

Complete instructions for lubrication of the various points of the 1973 Cadillacs are described in this section. An Engine Oil Change Interval and Viscosity Chart, and a Fluid Capacity Chart appear at the end of this section, on Page 0-21. The Maintenance Schedule, Pages 0-18 through 0-20, is based upon service at time of engine oil change, unless otherwise specified.

The recommended engine oil change interval, regardless of season, is every 4 months, never to exceed 6,000 miles. More frequent changes are required with stop and go operation, prolonged idling periods, trailer towing, dusty road travel, or during extended cold or wet climatic conditions. In such cases, an oil change is recommended after 2,000 or even 1,000 miles of driving.

The various points on the chassis that require a lubricant are listed in the Maintenance Schedule, Pages 0-18 through 0-20. Maintenance should be performed according to the intervals specified on the Schedule. Use factory recommended fluids in the quantities specified.

1. Front Suspension

Spherical joints are used on the front suspension system at the outer ends of the upper and lower control arms, and at the inner and outer steering linkage tie rod pivots.

These joints should not need repacking throughout their entire service life under normal driving conditions. At the time of an engine oil change, visually inspect all joint seals for any indication of damage, such as cuts, tears, ruptures, worn spots, etc. If a damaged seal is evident, the seal must be replaced and the joint repacked. Special front suspension lubricant is recommended for the repacking operation.

The procedure for replacing and repacking the upper and lower suspension arm spherical joint seals is described in Section 3, Notes 25 and 28 for Eldorados and Notes 8, 9 and 10 for all other cars.

Extended life spherical joints are used at both inner and outer tie rod pivots. The only maintenance normally required is to inspect the seals for physical damage each time the engine oil is changed. If periodic inspection reveals a damaged seal, the seal may be replaced and the joint repacked as described in Section 9, Note 22. If a loose joint is found, replace the joint as described in Section 9, Notes 17 and 34.

2. Engine

a. Engine Oil Recommendations

The original factory fill oil will perform satisfactorily during the normal change interval specified on the Engine Oil Change Interval and Viscosity Chart, Page 0-21, because this oil meets the specifications for service "SE". The same chart should also be consulted for factory recommendations if additional oil should be necessary prior to the normal change interval.

The use of proper engine oil is the best assurance of continued reliability and performance from a Cadillac engine. Cadillac does not recommend oils by brand name, as assurance of oil quality is the responsibility of the refiner. Instead, the factory recommends oils that, according to their labels, are intended for service "SE". Cadillac Servicemen should assist owners in the selection of the proper oil that meets the above requirements, as well as the proper viscosity number for a particular area and season.

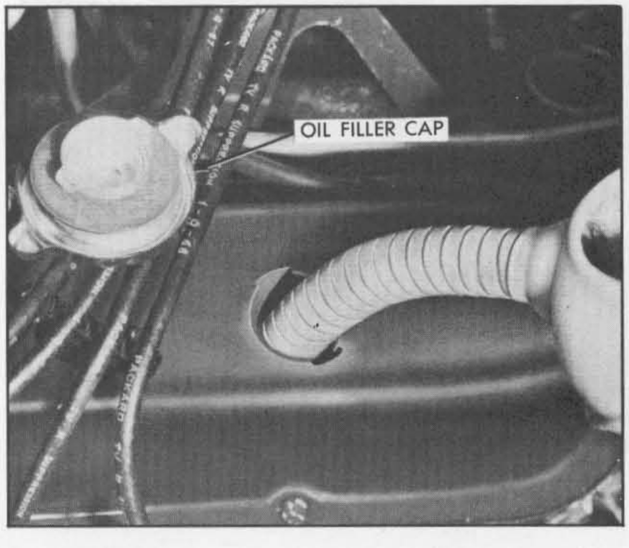


Fig. 0-8 Adding Engine Oil

In areas where the temperature seldom drops below zero, most 10W or 10W-40 oils are satisfactory for easy starting of the engine. When the temperature is frequently near or below zero, a 5W-20 or 5W-30 oil is recommended.

(NOTE: 5W-20 oils are not recommended for sustained high speed driving. Non detergent and low quality oils are specifically not recommended for any type of service.)

b. Adding Engine Oil (Fig. 0-8)

Always maintain the correct oil level. Oil should be added only when the level reaches the "Add One Quart" mark on the dipstick. Do NOT add oil if oil level is above the "Add 1 Qt" line, or foaming may result. For an accurate check of oil level wait 10 to 15 minutes after shutting off engine to allow time for oil to drain back into pan. Always check engine oil level when engine is hot.

Engine oil is added by removing the oil filler cap on the right rocker arm cover, Fig. 0-8.

c. Changing Engine Oil

The engine should be drained of oil only after it has been warmed to normal operating temperature. The benefits of draining are minimized if the crankcase is drained when the engine is cold, as some suspended foreign matter will cling to the internal engine parts and will not drain with the slower moving colder oil.

The Engine Oil Change Interval and Viscosity Chart, Page 0-21, will serve as a guide for the proper oil change interval and oil viscosity to be used at the prevailing temperature. It is unnecessary to change the oil for the occasional unseasonably cold or warm day encountered during the fall or spring season.

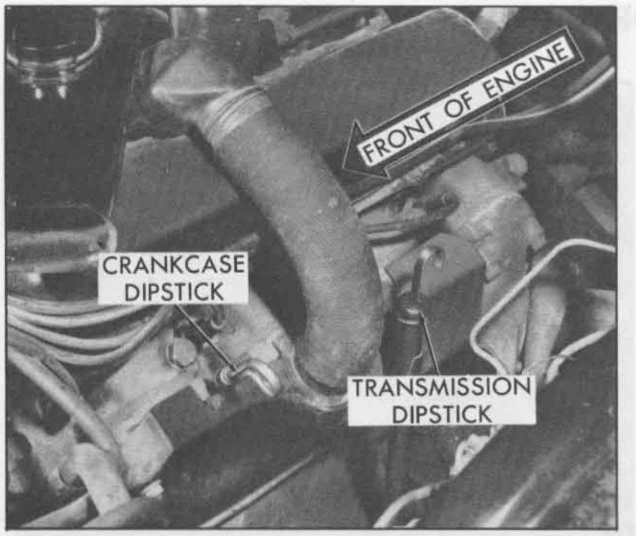


Fig. 0-9 Dipstick Locations-Eldorado

The capacity is 4 quarts (5 quarts on Eldorado). Do not add more than 4 quarts except when changing oil filter in which case 5 quarts should be used (6 quarts on Eldorado).

The dipstick locations for the Eldorado are shown in Fig. 0-9.

(NOTE: The Eldorado engine has two oil pan drain plugs which must be opened when changing oil.)

3. Engine Accessories

a. Distributor

The Cadillac distributor is permanently lubricated and requires no periodic oiling. However, in the event the distributor is disassembled and the shaft or breaker plate is removed, the wick in the oil reservoir should be moistened with light weight engine oil.

When the contact point set is changed, the distributor cam lubricator should be rotated 1/2 turn. At the second engine tune up, 24,000 miles, the lubricator should be replaced. Rotate or replace lubricator with each engine tune-up.

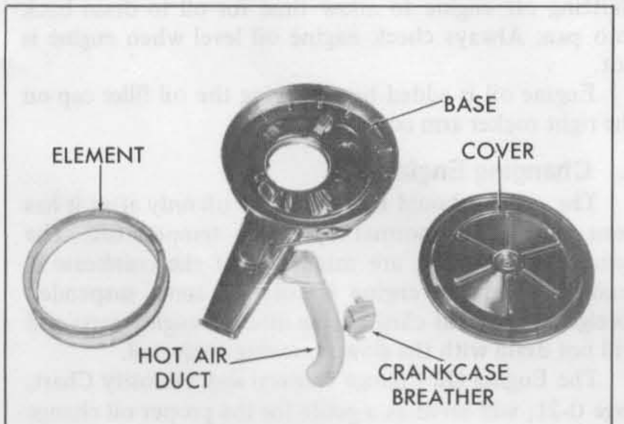


Fig. 0-10 Thermac Air Cleaner Assembly

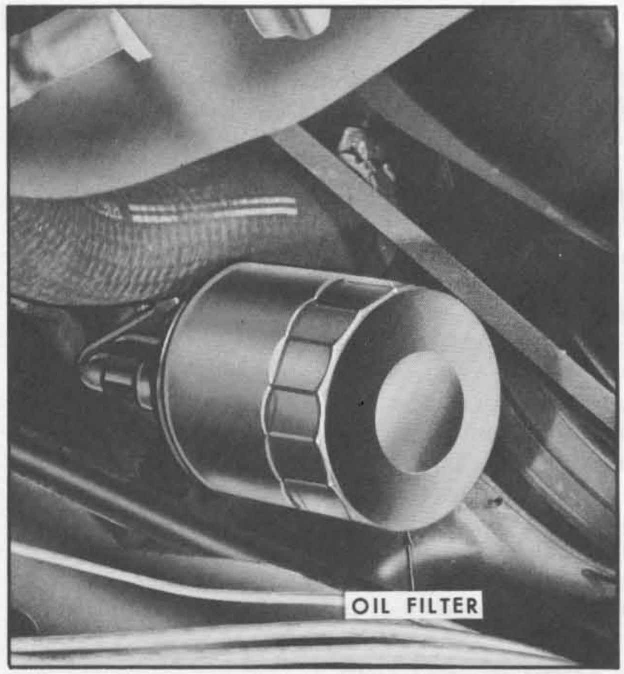


Fig. 0-11 Engine Oil Filter

b. Carburetor Air Cleaner

The carburetor air cleaner, Fig. 0-10, incorporates a replaceable paper element. A new air cleaner element should be installed every 24,000 miles. More frequent replacement of the element may be necessary if the car is constantly driven in dusty areas. A visual inspection of the element is recommended periodically to make certain that it is properly seated and that there is no indication of dust leakage. If dirt or damage is indicated at time of visual inspection, the element should be changed. To replace element, proceed as follows:

1. Remove cover from carburetor air cleaner.
2. Remove element and discard.
3. Wipe all dirt from inside air cleaner cover.
4. Install a new element on air cleaner base, making certain that it is properly seated and replace air cleaner cover.

c. Engine Oil Filter (Fig. 0-11)

The engine oil filter is of the spin-on, full-flow type. It is recommended that the filter be replaced at time of first engine oil change and every second oil change thereafter.

The full-flow type oil filter filters 100% of the oil delivered by the oil pump. For this reason, it is very important that the recommended oil filter change intervals be followed.

The oil filter is mounted on the front right side of the engine, Fig. 0-11. Access to the filter is gained from under the car. Replacement procedure is as follows:

1. Position car on hoist.
2. Unscrew filter from base and discard.
3. Wipe gasket area of base clean.
4. Place a light film of silicone on top of gasket and screw filter on stud of filter base by hand until gasket touches filter base. Then tighten element an additional 2/3 of a turn.

5. Add 1 quart of oil to engine crankcase.

(NOTE: If engine oil is changed in conjunction with oil filter replacement, add a total of 5 quarts of oil to engine crankcase (6 on Eldorado).)

6. Operate engine at fast idle and check for oil leaks at filter base.

7. After engine has run for 3 to 4 minutes, stop engine and check oil level.

4. Battery

The battery electrolyte level should be checked at every engine oil change. In warm weather, a check should be made at two-week intervals. An electrolyte level indicator vent cap is located in the second cell cap from the positive battery terminal.

The indicator cap makes it unnecessary to remove cell vent caps when checking fluid level. A dark (black) spot in the center of this vent cap is visible when electrolyte is at the normal level.

If at any time the electrolyte level drops below normal, the spot changes from black to an off-white color. When an off-white condition is encountered, all cell fluids must be adjusted to their correct level. This is accomplished by adding colorless, odorless drinking water to raise the fluid level to the bottom of the slot in each vent-well.

CAUTION: Do not overfill battery or add any substance to fluid except colorless, odorless drinking water.

When replacing battery cables retorque screws to 70 inch-pounds.

CAUTION: Over torquing terminal screws may strip threads in terminal or short out battery. Use only proper size (3/8 x 16 coarse).

Keep battery, cable clamps, and hold-down bracket clean. If necessary, clean with a solution of ammonia and water, or baking soda and water. Flush off with water and apply petroleum jelly to cable clamps and terminals to retard corrosion.

5. Emission Control Systems

The Federal Clean Air Act stipulates that it is unlawful "for any person to remove or render inoperative any device or element of design on a motor vehicle in compliance with regulations." A further provision stipulates that "the manufacturer shall furnish with each new Motor vehicle" . . . "written instructions for the maintenance and use of the vehicle or engine by the ultimate purchaser as may be reasonable and necessary to assure the proper functioning of emission control devices and systems."

a. Thermac Air Cleaner

The thermac air cleaner should be inspected to make certain that all hoses and ducts are intact and correctly installed. Operational function should be checked as described in Section 6, Note 79.

b. Choke

Choke mechanism should be checked for free operation after four months or 6,000 miles (whichever comes first) and at 12 month/12,000 mile intervals thereafter. A binding condition may have developed from gum formation on the choke shaft or from damage. Choke shafts can usually be cleaned without disassembly by using X-66 Carburetor Conditioner or equivalent.

c. Carburetor to Manifold Screws

Carburetor attaching screws should be carefully adjusted to correct torque to compensate for compression of gasket at first 4 months or 6,000 miles of vehicle operation only. Correct torque on front screws is 10 foot-pounds. Tighten rear screws to 14 foot-pounds.

d. Fuel Filter

A clogged fuel pump filter may restrict fuel flow. Replace filter each 12 months or 12,000 miles whichever occurs first.

e. Spark Plugs

Spark plugs must be replaced at 6,000 miles when operating with leaded fuels or at 12,000 miles when using unleaded fuels.

Use of leaded fuels results in lead deposits on spark plugs and can cause misfiring. Where misfiring occurs prior to 6,000 miles, spark plugs in good condition can often be cleaned, tested, and reinstalled in an engine with acceptable results.

f. Engine Compression

Minimum compression recorded in any one cylinder should not be less than 70% of highest cylinder.

This test should be performed to provide reasonable assurance that engine condition is sufficiently efficient to prevent leakage of unburned gases. Check compression every 24 months or 24,000 miles.

g. Distributor Points, Cam Lubricator

Distributor points should be inspected prior to performance of tune-up adjustments. Burned or pitted points must be replaced. Points in good condition may be reused after readjustment and the rotation or installation of the cam lubricator. Points should be replaced every 12 months or 12,000 miles. New cam lubricator should be installed at least every 24,000 miles.

h. Distributor Cap

The interior and exterior of the distributor cap should be carefully inspected and cleaned to prevent misfiring and deterioration every 24 months or 24,000 miles.

i. Spark Plug Wires

Inspect spark plug wires for evidence of checking or cracking of exterior insulation and a tight fit in the distributor cap and spark plugs. Exterior of wires should be cleaned, any evidence of corrosion on ends removed and wire replaced if deteriorated. Check should be made after first 24 months or 24,000 miles and at every 12 month/12,000 miles thereafter.

j. Timing, Dwell, Idle Speed

These adjustments must be performed accurately, following the specifications and procedures described in Section 6, Notes 36, 37, and 62b. Adjustments must be made with test equipment known to be accurate.

Proper functioning of the carburetor is particularly essential to control of emissions. Correct mixtures for emission compliance and idle quality have been preset by Cadillac. Plastic idle mixture limiters are installed on the idle mixture screws to prevent unauthorized adjustment.

These idle limiters are not to be removed unless made necessary by some major carburetor repair or replacement which affects the idle screw adjustment. Thereafter, the idle mixture must be readjusted as described in Section 6, Note 62a, and a new red plastic limiter installed.

k. Thermal Vacuum Switch & Hoses

The thermal vacuum switch should be tested every 12 months or 12,000 miles as described in Section 6, Note 28b. Vacuum control hoses must be in good condition, correctly installed and fit tightly.

l. Exhaust Gas Recirculation System

This system should be tested as described in Section 6, Note 80 at 12 month/12,000 mile intervals when using leaded fuels or at 24 month/24,000 mile periods if using unleaded fuels.

m. Evaporation Control System Fuel & Vapor Lines

All fuel and vapor lines and hoses must be in good condition with no signs of leakage. Any damaged or deteriorated lines or hoses must be replaced. All lines should be inspected for proper connections and correct routing.

n. Evaporation Control System Canister

Check canister for cracks or damage when replacing the canister filter. Replace filter every 24 months or 24,000 miles.

o. Evaporation Canister Filter

Remove canister and replace filter in lower section of canister.

p. Positive Crankcase Ventilation System

The PCV system should be checked for satisfactory operation at 12-month or 12,000-mile intervals using a tester such as CT-3.

Replace the PCV valve at 24 months or 24,000 mile intervals (whichever occurs first). PCV valve hose, when removed for valve replacement, should be blown out with an air hose to make certain that it is clean. The PCV valve should be replaced at 12 months or 12,000 miles (whichever occurs first) when the vehicle is used under the following conditions:

- Driving in dusty conditions
- Extensive idling
- Trailer towing
- Short trip operation at freezing temperatures (engine not thoroughly warmed-up)

Cleaning of the crankcase ventilating breather is important in order to provide proper crankcase breathing. The breather is located on the left rocker arm cover. The filtering material in the unit must be cleaned with solvent at every oil filter change. Do not oil the filtering element.

q. Idle Stop Solenoid

Check for proper operation every 12 months or 12,000 miles. Replace solenoid if inoperative.

r. Air Injection Reactor Pump & Engine Drive Belts

Engine belts must be properly adjusted. A slipping belt will not operate the AIR pump satisfactorily. Deteriorated belts should be replaced.

s. Air Injection Reactor System Hoses & Connections

Check AIR system hoses and fittings for loose connections and deterioration. Test diverter valve by quickly depressing and releasing throttle and holding hand under diverter valve exhaust. If exhausted air can be felt during engine deceleration, valve is operating properly. Inoperative diverter valves should be replaced.

t. Test Coolant Level

Engine coolant should be checked for proper level and for corrosion protection to at least -40°F and for freeze protection to the lowest temperature expected during the period of vehicle operation. Each two years or 24,000 miles, whichever first occurs, cooling system must be drained, flushed and refilled with a new coolant solution. See Section 6, Note 4, for additional details on cooling system care.

u. Radiator Core Exterior

For proper cooling efficiency, the exterior of the radiator core and A/C condenser, if so equipped, must be kept clean. Light brushing and reverse air flow is usually a satisfactory cleaning method. Insects can usually be removed with a garden hose using light water pressure.

v. Fuel Cap, Fuel Lines, and Fuel Tank

The fuel tank, cap, and lines should be inspected for road damage that could cause leakage. Inspect fuel cap for correct sealing ability and indications of physical damage. Replace any damaged or malfunctioning parts.

w. Automatic Transmission Fluid

Oil level in the automatic transmission must be checked at each engine oil change. Under normal driving conditions the transmission fluid should be changed every 100,000 miles. Under unusual conditions such as constant driving in heavy city traffic during hot weather, trailer towing, etc. fluid should be changed at 50,000-mile intervals. It is important that transmission fluid level be maintained at the full mark and not over

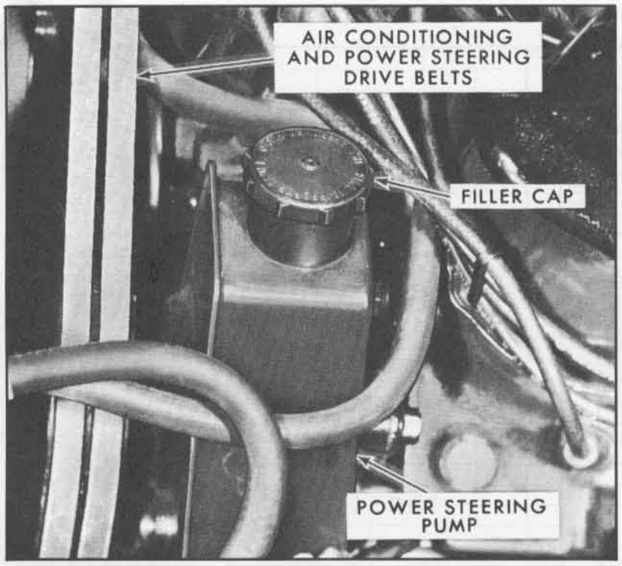


Fig. 0-12 Power Steering Pump Reservoir

filled. See Section 7, Note 6, for additional details on transmission care.

6. Power Steering

The steering gear is lubricated by the power steering fluid and requires no other lubricant. The fluid level in the pump reservoir, Fig. 0-12, should be checked every spring and fall after the engine is warm, and the reservoir kept filled with special power steering fluid, Part Number 1050017, or its equivalent. If the dipstick indicates that the fluid level is extremely low, the unit should be inspected for leaks and corrected immediately. When making a complete fluid change, always use special power steering fluid available from servicing parts warehouses. When topping off the fluid, if the special fluid is not available, Dexron Automatic Transmission Fluid or equivalent may be used. Refer to Section 9, Note 1, for checking fluid level.

7. Power Brakes

The brake fluid level of both sections of the master cylinder, Fig. 0-13, should be checked at every engine oil change and every time the brakes are serviced. The reservoir cover incorporates a diaphragm that provides a seal between the reservoir fluid and the atmosphere to prevent moisture absorption or dust contamination.

If either the front or rear brake reservoir is found to be low, the related hydraulic system should be checked for leaks. Then fill the reservoir with Super Heavy Duty Brake Fluid, Part Number 5464831, or equivalent fluids conforming to SAE J-1703 specifications, to within 1/8 inch to 3/8 inch of the reservoir sealing surface.

Check travel of service brake pedal and the parking brake pedal every 4 months never to exceed 6,000 miles. Excessive brake pedal travel is an indication of the air in the fluid or some other brake system malfunction.

Service brake pedal travel should not exceed 1-3/4 inch during normal brake pedal application of approximately 30 pounds force (2" on Eldorado). The parking brake pedal should travel 1-3/4 inch to 2-3/4 inch with moderate application (50 pounds force).

Refer to Section 5 for adjustment procedures should either pedal travel be found incorrect.

8. Air Conditioner Compressor

The 6 cylinder compressor uses 525 viscosity oil. It is important that only the type of oil recommended by the compressor manufacturer be used. Refer to Section 1, Note 44f for lubricating recommendations.

9. Transmission

a. Fluid Recommendations

Dexron Type Automatic Transmission Fluid or fluid of equivalent quality is recommended exclusively for use in Cadillac automatic transmissions. It should be used both for adding and refilling. Dexron fluid or its equivalent incorporates additives not used in regular fluid-additives that are essential for satisfactory transmission performance. Fluid of this quality is distributed by General Motors and by other oil marketers.

b. Checking Fluid Level

The transmission dipstick and filler tube is located on the right side of the engine (left side on the Eldorado, Fig. 0-9).

Fluid level should be checked at every engine oil change. Add fluid, if necessary, until proper level is indicated on dipstick. Proper fluid level is based on operating temperature. See Figs. 0-14 and 0-15. At normal operating temperature, 1 pint of fluid will change the level from the low mark to the full mark on the dipstick.

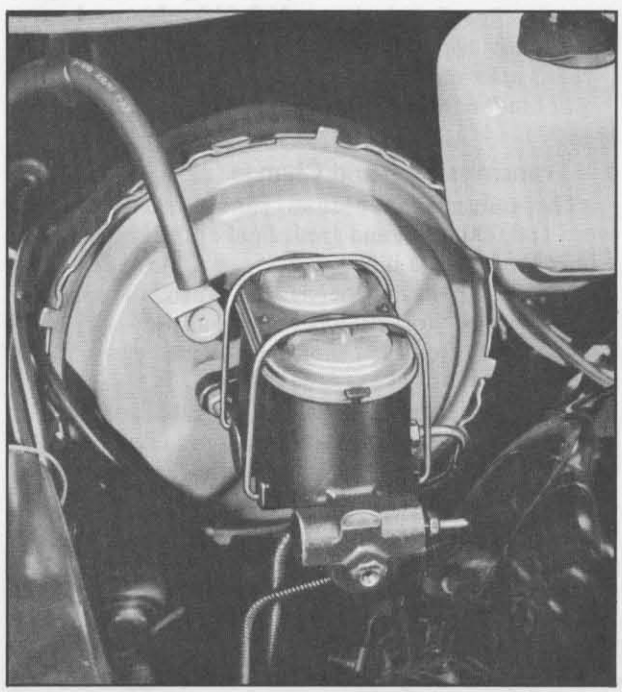


Fig. 0-13 Power Brake Reservoir

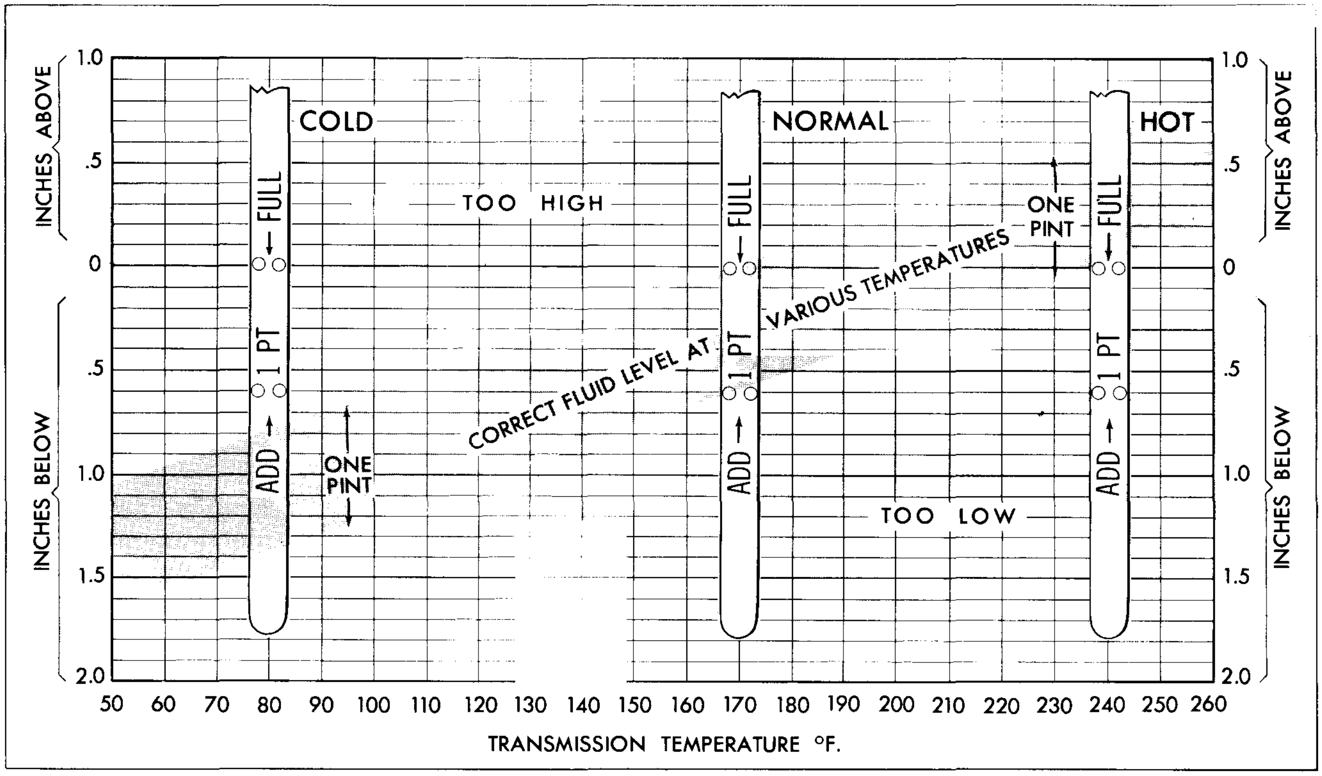


Fig. 0-14 Transmission Oil Level-Except Eldorado

When checking fluid level, first run engine at 800 rpm with shift lever in Park "P" position for 1-1/2 minutes to make certain converter is full. Reduce engine speed to slow idle, remove and wipe dipstick, then check fluid level. With the engine still running, add fluid through dipstick tube to bring fluid to proper level.

CAUTION: Do not overfill, as foaming may occur when fluid heats up. If fluid level is too low, especially when cold, complete loss of drive may result after quick stops. Extremely low fluid levels will result in damage to the transmission.

c. Transmission Fluid Change

The transmission bottom pan should be drained every 100,000 miles and fresh fluid added to obtain the proper level on the dipstick. For cars subjected to heavy city driving, or in commercial use where the engine is regularly idled for prolonged periods, or for trailer towing, the bottom pan should be drained every 50,000 miles.

1. Remove dipstick from filler tube and insert a length of hose secured to a suction gun down the filler tube. Remove enough transmission fluid so that bottom pan will not overflow when removed.
2. Raise car and remove bottom pan. Empty pan and clean with solvent.
3. Install bottom pan using a new gasket.
4. Lower car and add 2 quarts of transmission fluid through filler tube.
5. Operate engine at 800 rpm for approximately 1-1/2 minutes with selector lever in park "P" position.
6. Reduce engine speed to slow idle and check fluid level. Add fluid, if necessary, to bring to proper level, Figs. 0-14 and 0-15.

d. Oil Filter

The oil intake system incorporates an oil filter in the transmission oil sump. The filter must be replaced after the first 100,000 miles only, or after a major transmission failure. The procedure for removing and installing the filter is described in Section 7, Note 6c.

e. Transmission Linkage

Lubricate all transmission linkage friction points each spring and fall with a grade 3 zinc oxide grease (except Eldorado). Lubricate Eldorado linkage with a grade 2 lithium soap grease.

10. Front Wheel Bearings (Except Eldorado) Rear Wheel Bearings (Eldorado Only)

These wheel bearings require repacking and adjusting when the brake linings or pads are replaced. When repacking these bearings, use a #2 grade lithium high melting point wheel bearing grease free from any fillers or abrasives. Refer to Section 3, Note 17 for repacking procedure.

11. Differential (Except Eldorado)

Check the lubricant level in the differential only on the first inspection and add lubricant if necessary. The differential lubricant level should be within 1/2 inch of the lower edge of the filler hole. Each spring and fall,

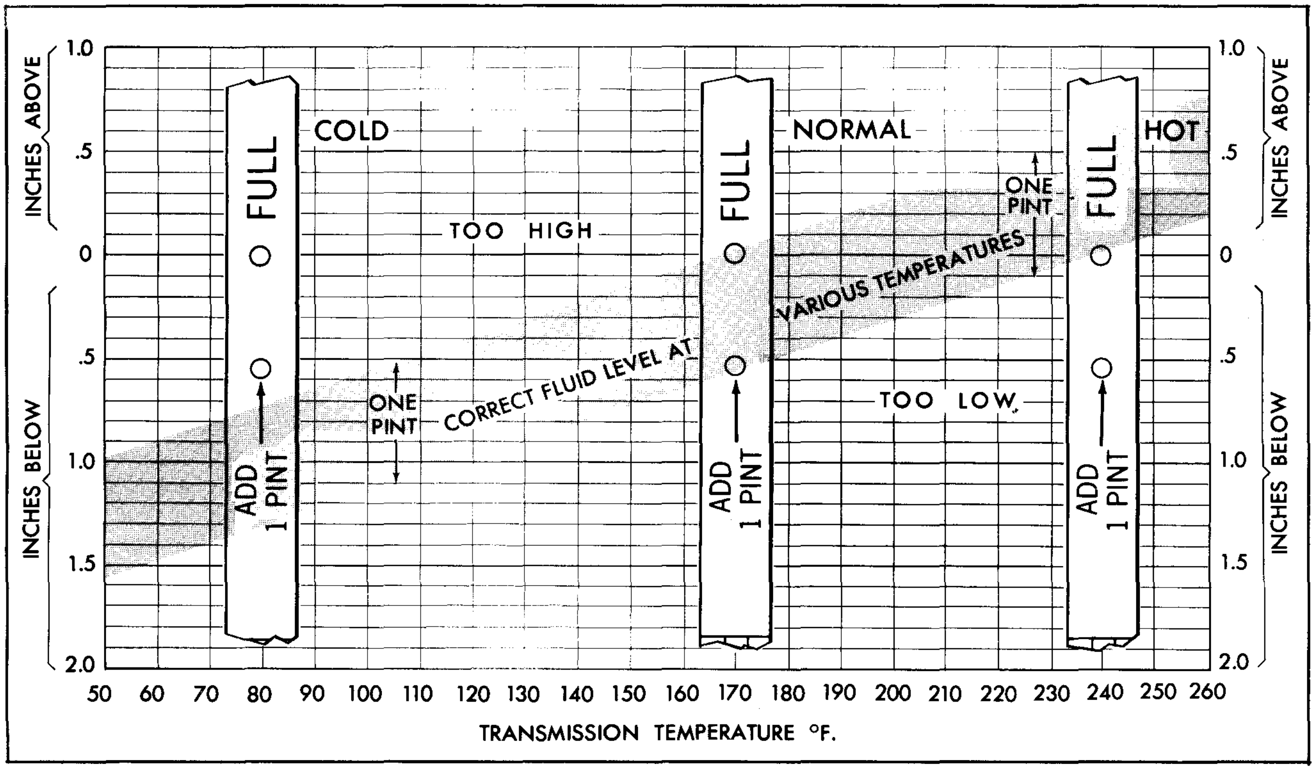


Fig. 0-15 Transmission Oil Level-Eldorado

inspect differential assembly for external signs of leakage and check lubricant level only if leakage is evident.

Either SAE 80 or SAE 90 GL-5 multi-purpose type gear lubricant conforming to MIL-L-2105-B specifications or the controlled differential lubricant can be used for cars equipped with the standard differential. Cars equipped with the Controlled Differential should use only the special lubricant, Part Number 1050189, or its equivalent, to assure the satisfactory operation of this unit.

For vehicles normally operated in Canada, SAE 80 GL-5 gear lubricant is recommended.

When removing the filler plug, take extreme care not to allow any dirt to enter the filler hole.

Draining and refilling of the differential is necessary only when performing service operations inside the differential.

12. Final Drive (Eldorado Only)

Check the lubricant level in the final drive only at the first inspection and add lubricant if necessary. The final drive lubricant level should be within 1/2 inch of the lower edge of the filler hole. Each spring and fall, inspect the final drive assembly for signs of external leakage at the output shaft seals and at the pan gasket, and check lubricant level only if leakage is evident.

The factory recommended fluid for the final drive assembly is either SAE 80 or SAE 90 GL-5 multi-purpose type gear lubricant conforming to MIL-L-2105-B specifications.

For vehicles normally operated in Canada, SAE 80 GL-5 gear lubricant is recommended.

When removing the filler plug, take extreme care not to allow any dirt to enter the filler hole.

Draining and refilling of the final drive is necessary only at time of replacement.

13. Propeller Shaft

The propeller shaft does not require maintenance on a regularly scheduled basis. Whenever the shaft is disconnected at the transmission, lubricate the outside diameter of the front propeller shaft yoke with Automatic Transmission Fluid, and the inside diameter with propeller shaft slip yoke lubricant, or an equivalent lubricant.

14. Additional Lubrication Points

The moveable mechanical parts of the body are lubricated during production to insure proper and quiet operation. If additional lubrication is required, lubricants should be used according to the directions in Section 2 of the body service manual.

In addition the following points should be lubricated as indicated.

a. Hood Latch Mechanisms

Every 4 months or 6,000 miles, whichever occurs first, lubricate hood latch assembly and hood hinges as follows:

Wipe off any accumulation of dirt or contamination on latch parts and apply lubricant to latch striker and latch locking plate. Apply light engine oil to pivot points in release mechanism, as well as primary and secondary latch mechanism.

b. Hood Hinges

Lubricate hood hinges. Make hood hinge and latch mechanism functional check to assure the assembly is working correctly.

c. Fuel Filler Door Hinges

Apply a light coat of zinc oxide grease to all moving joints of the fuel filler door hinges each spring and fall.

15. Points Requiring No Lubrication

No lubrication is required at the generator; water pump; propeller shaft bearings; driven wheel bearings; upper and lower rear control arms; rear springs; shackles, or spring liners on Seventy-Five and Commercial Chassis; starter motor; speedometer cable; Automatic Level Control Compressor; or front bumper Energy Absorbing Devices, as all of these are packed with sufficient lubricant at time of assembly.

Although periodic lubrication is not required, replace damaged seals and add special lubricant, if required at the following locations:

a. Front upper and lower suspension arm pivot points.

b. Pitman arm or idler arm pivots.

c. Tie rod linkage.

16. Vibration Complaints and Correction

There are several excitation sources and many responding systems which may cause an annoying vibration. The first step is to identify individual vibration complaints by systematically classifying them, during a road test, into one or more of the following categories: (1) car speed sensitive, (2) engine speed sensitive, (3) torque (throttle) sensitive, or (4) jounce sensitive. Since each of these categories has specific vibrations associated with it, this classification will give direction to the proper area for analysis of the problem. This will eliminate many components that cannot be the cause, and will focus attention on only those items that can contribute to the specific condition encountered.

1. Road Test

Prior to the initial road test, check and adjust the tire pressures and install an engine tachometer. Next, ride the car with the owner driving and have him point out the disturbance with which he is concerned.

(NOTE: The importance of riding the car with the owner cannot be over-emphasized.)

If the condition is normal, and no corrective work is needed, the owner should be told immediately. This normalcy can be demonstrated with other vehicles, pointing out that similar vehicles have the same condition.

2. Sensitivity Classification

Having verified that a vibration problem does exist, the first step in correcting the problem is to classify it in terms of one or more of the following sensitivity categories.

a. Car Speed Sensitive

Most vibration complaints will be found to be car speed sensitive, i.e., the frequency of the excitation depends only on the speed of the vehicle. To determine if a given problem is car speed sensitive:

(1) Drive the car in "Drive Left" and record the car speed and the engine RPM at which the problem occurs.

(2) Shift the car into "Drive Right" and again record the car speed and the engine RPM at which the problem occurs.

(3) If the problem occurs at the same car speed as when the car was in "Drive Left", the vibration is car speed sensitive.

(NOTE: It is possible that two problems could occur at the same car speed. Decelerate the engine to the RPM obtained in Step 1 and check to see that problem has disappeared. If it has not, there are two problems: one of which occurs at the car speed determined in Step 1, while the second occurs at the engine speed determined in Step 1.)

b. Engine Speed Sensitive

Another group of vibration complaints will be found to be engine speed sensitive, i.e., the frequency of the excitation depends only on the speed of the engine, independent of the speed of the vehicle. Hence, to determine if a given problem is engine speed sensitive:

(1) Drive the car in "Drive Left" and locate the vibration problem. Record the car speed and the engine RPM at which the problem occurs.

(2) Shift the car into "Drive Right" and again locate the vibration problem. Record the car speed and the engine RPM at which the problem occurs.

(3) If the problem occurs at the same engine speed as when the car was in "Drive Left", the vibration is engine speed sensitive.

c. Torque Sensitive

A torque sensitive problem is one which increases in intensity as the torque (power) output of the engine increases, i.e., the intensity of the vibration increases as the throttle opening is increased. To determine if a given problem is torque sensitive:

(1) Drive the car in "Drive Left" and record the car speed and engine RPM at which the problem occurs.

(2) Observe the condition while varying the throttle position. Drive the car with steady throttle, slowly increasing to heavy throttle by going up hill or applying the brakes while increasing the throttle opening, and slowly decreasing to minimum throttle by coasting through the vibration speed.

(3) If the condition becomes more severe as the throttle opening is increased, the vibration is torque sensitive.

d. Jounce (or Load) Sensitive

A jounce (or load) sensitive problem is one which varies in intensity as the height of the car changes with respect to the surface of the road, i.e., the intensity varies as the rear springs are extended or compressed. To determine if a given problem is jounce (or load) sensitive:

(1) Drive the car and observe the condition with varying passenger load.

(2) Alternatively, drive the car over a road that dips in such a way that it causes the rear of the car to move up and down relative to the surface of the road. Keeping a constant throttle, observe the condition.

(3) If the condition varies depending on the passenger load (or varies as the rear of the car moves up and down), the problem is jounce (or load) sensitive.

e. Multiple Classification

In the process of classifying vibration problems in terms of these four sensitivity categories, you will find that many problems fit more than one of the categories. Combining these categories into their possible combinations, the majority of all vibration problems will fall into one of the following "classes" of categories:

(1) Engine speed sensitive only
(2) Car speed sensitive only
(3) Torque sensitive and car speed sensitive
(4) Torque sensitive and engine speed sensitive

3. Engine Speed Sensitive Only

Problems in this class may be duplicated with the car stopped and the transmission in neutral by running the engine at the RPM at which the disturbance was felt during the road test. All additional appraisals can thus be made under this "free engine" condition.

"Free engine" problems can be due to belts or engine driven accessories (power steering pump, generator, air conditioning compressor, fan, etc.). To isolate the offending component, first check the torque on all accessory mounting bracket bolts. Also, check the condition and tension of all accessory drive belts. If any abnormal conditions are found, correct and retest for the vibration problem.

Air conditioning compressor problems can be diagnosed by turning compressor off and on while the vibration problem is being experienced.

If tightening the accessory mounting bolts and adjusting the drive belt tensions fails to correct the disturbance, remove accessory drive belts, one at a time, tighten the accessory mounting bolts, and retest for the problem. Continue to remove the belts one at a time until the offending component is located.

CAUTION: With the water pump drive belt removed, the engine will overheat rapidly; hence, this appraisal must be made very quickly.

4. Car Speed Sensitive Only

All tire problems are sensitive to car speed only. Driveline unbalance or runout is sensitive to car speed at the rate of one vibration per revolution (First Order). Driveline vibrations at the rate of two or more vibrations per revolution, on either "C" cars or Eldorado, are sensitive to both car speed and torque, and should not be considered as "car speed sensitive only"

(NOTE: Vibration appraisal on the hoist should be performed on car speed sensitive problems only. Analysis of torque sensitive problems on stands will very often lead to erroneous conclusions, due to the fact that no appreciable torque is transmitted when the vehicle's tires are not touching the pavement.)

CAUTION: This procedure should never be attempted on the drive (front) wheels of an Eldorado. On these vehicles, evaluation must be done on the road.

a. Suspension Hop and Tramp (Tire Balance)

In order to verify suspension hop & tramp as excited by tire balance and/or runout, proceed as follows:

(1) Install a complete set of known good wheel, tire, and brake drum assemblies on the car and retest on the road.

(NOTE: In all cases when removing the owner's wheels, tires, and brake drums, use care to index mark the brake drums to their respective wheel and tire assemblies so that they may be reinstalled in their original positions.)

If the problem disappears, then concentrate on the tire-and-wheel assemblies as being the cause of the problem, and hence proceed to Part b. If the problem still occurs in the same manner as before, inspect brake drums and/or rotors for unbalanced condition or body mounts for failure or improper torque, since the tire-and-wheel assemblies are obviously not at fault.

(2) If known good tire, wheel, and drum assemblies are not available, place the car on a hoist or jack stand so that the rear of the car is supported by the axle, and remove the rear tire, wheel, and drum assemblies. Retest the problem speed in the car under these conditions. If the disturbance is still present at the problem speed, tires are not the problem. If the disturbance cannot be duplicated on the hoist, then the tire, wheel, and drum assemblies were at fault and, hence, proceed to Step 3.

CAUTION: This procedure should never be attempted on the driving (front) wheels of an Eldorado. It is therefore necessary to use the substitution method on those vehicles.

(3) Reinstall original tires in their original positions and balance all four tire, wheel, and drum assemblies. Retest on the road.

b. Balancing Wheels, Tires, and Brake Drums

Many wheel balancers will adequately balance the wheel-tire-brake drum assembly; however, it is the skill of the operator that really counts. The operator must be well trained on the equipment used.

c. Checking Tire, Wheel Brake Rotor and Rear Axle Runout

Excessive runout will cause a vibration which is exactly like unbalanced wheels and tires. After balancing tires, if a 1st order tire disturbance still exists, check runout as follows:

1. Wheel and Tire Runout

Follow procedure described in Section 10, Note 10c. If the runout cannot be reduced to acceptable values by repositioning the tire and wheel, replace the parts at fault. Retest on the road.

2. Brake Rotor and Axle Shaft Runout

a. If after checking wheel runout (radial and lateral), it is determined that excessive runout is present, check brake rotor or axle shaft for runout with a dial indicator before replacing wheel. Refer to Section 5, Note 15 for specifications on rotor runout. Axle flange runout should be less than .006 inch.

b. If lateral (in-out) wheel runout (wobble) is beyond specifications, check brake drum to wheel pads (front end) or axle flange (rear end) for lateral runout. The dial indicator stem should contact the axle flange or drum pads as close as possible to the outboard side of the studs.

d. Tire Radial Force Variation

If the disturbance is still present, the problem is due to a non-uniformity in one or more of the tires. This fault is inherent in the tire and often cannot be corrected by any means other than replacement. The problem which remains at this point, however, is to isolate the offending tire(s). This may be accomplished by using a machine capable of measuring loaded radial runout. See Section 10, Note 9.

5. Torque Sensitive and Car Speed Sensitive

The only excitation which is both car speed sensitive and torque sensitive is 2nd Order driveline (two vibrations per revolution) on the "C" car or 3rd Order Driveline (three vibrations per revolution) on the Eldorado. These problems are caused by improper drive shaft angles which are a result of wrong standing height or faulty joints. Refer to Section 3, Note 1 or 18 to check standing height. Drive axle joint replacement is described in Section 3, Notes 35 and 36. Constant velocity universal joint repair is described in Section 4.

6. Torque Sensitive and Engine Speed Sensitive

The only excitation which is both engine speed sensitive and torque sensitive is the "firing order" excitation (that is, 4th Order for an eight cylinder engine). The problems likely to be encountered in this class are as follows:

a. An engine-driven accessory (power steering pump, generator, air conditioning compressor, etc.) excited by 4th Order Engine.

Engine driven accessories generally do not present a problem if all attachment bolts are torqued to specifications and all drive belts are adjusted to the proper tension. Hence, in order to verify that an engine-driven accessory is not the cause of a vibration complaint:

b. Check installation torques on all attachment bolts securing either an accessory to its mounting or the mounting to the engine.

c. Check all drive belts for correct tension. Also check the physical condition of the belts.

d. Visually inspect each accessory to ensure that the bracketing installed is complete and properly assembled.

e. The checks outlined above should be performed and any irregularities corrected before proceeding.

f. Power plant "bending" as excited by 4th Order Engine.

(1) Loosen the top four bolts which attach the transmission to the engine, and reappraise the problem. If this is the actual cause of the complaint, the problem should now occur at a much lower engine speed than it did originally, or be completely eliminated. Retorque bolts before proceeding.

(2) Having thus verified that this is the actual cause of the complaint, the following procedures are suggested as a means of correction:

(3) Inspect the vehicle to be sure the entire engine-transmission assembly and the exhaust system are not in contact with the frame or body.

(4) Inspect the engine and transmission mounts to be sure they have not sagged, failed, or been distorted.

(5) Check the initial spark advance setting.

(6) If these inspection procedures reveal any irregularities, correct and retest on the road.

g. Exhaust system "bending" as excited by 4th Order Engine. (This may include either the crossover pipe, exhaust pipe, or tailpipe.)

CAUTION: It is often convenient to test for exhaust system vibrations by stalling the engine in Drive with the brakes applied. However, a car should never be stalled at engine speeds greater than 1200-1300 RPM and never for extended periods of time, since the transmission may overheat. When this method of testing is used, it is best done on a hoist, permitting the driveline and rear axle to rotate after each appraisal to circulate transmission oil. Do not use this test method for any problem occuring above 1300 RPM.

When a particular component of the exhaust system, such as the exhaust pipe or tailpipe, is suspected of causing a vibration problem, it may be verified by the following procedure:

(1) Put the car on a hoist with a helper behind the wheel and all doors and windows closed. Next, stall the vehicle in "Drive" as described above in the problem RPM range, while pressing a metal object (such as a wrench or screwdriver) lightly against the suspected component. If this component is the cause, it will "buzz" or "rattle" against the wrench or screwdriver due to its vibratory motion.

(2) To further verify that the suspected component is the cause, pull down rather heavily on that component while the driver evaluates the problem RPM range for any reduction in the level of the disturbance. This method of verification may also be applied on a road test by clamping a 5-10 lb. metal weight securely to the suspected component. Such a weight will change the resonant frequency of the component in question, and hence will change the problem speed if it is actually the cause.

(3) To verify disturbances produced by exhaust system components which resonate beyond 1300 RPM (such as the exhaust crossover), the stall technique cannot be used. In these cases, it is best to use the weight-and-clamp method together with a road test.

Having verified that some component of the exhaust

system is the cause of the problem, the following procedures should be used to correct the disturbance.

(4) Since the majority of exhaust system problems are due to "bound up" conditions, loosen all joints in the entire system, and let the pipes rest on floor stands while each clamp and bolt is torqued to specification. Refer to Section 8.

(5) Visually inspect the entire system for sufficient clearance of all points, (at least 1/2" in all directions) especially those in the direction of engine roll under acceleration.

(6) Visually inspect all exhaust system hangers to ensure that there is no metal-to-metal contact.

(7) Ensure that the end of the tailpipe is not directed at the inside surface of the rear bumper, but below it.

(8) After these procedures have been performed and any irregularities corrected, retest on the road.

17. Car Storage Preparation

Certain precautions must be taken when placing a car in "dead" storage for extended periods of time. Listed below are the recommendations to be followed when storing a car for 30 days or less, and for a period of 30 days to 12 months.

a. Car Storage Preparation—30 Days or Less

1. Wash car and inflate tires to 40 pounds pressure.
2. Provide proper cooling system protection.
3. Run engine until completely warmed up; then drain and refill with fresh oil which, according to the label on the can is intended for service "SE".
4. Run engine again with fresh oil until completely warmed up; drive car to place of storage and park. Do not restart again until end of storage period.
5. Be sure parking brake is in released position and car is on level surface.
6. If car is to be stored in a hot area, the fuel tank, lines, pump, filter, and carburetor should be drained.
7. Disconnect battery and prevent battery from discharging or freezing by keeping it fully charged.

b. Car Storage Preparation—30 Days to 12 Months

1. Wash car.
2. Run engine until completely warmed up; then drain and refill with fresh oil which according to the label on the can is intended for service "SE".
3. Run engine again with fresh oil until completely warmed up; drive car to storage area. Run engine at 2,000 rpm in neutral and pour engine oil into carburetor. After about a pint has been added, pour oil fast enough to stall engine.
4. Be sure parking brake is in released position and car is on level surface.
5. Drain gasoline from fuel tank.
6. Disconnect all fuel lines, blow out, and reconnect.
7. Remove carburetor, clean thoroughly, and store in plastic bag.
8. Remove fuel pump, clean, and store with carburetor. Remove filter assembly and discard.

(NOTE: Tape fuel pump, carburetor, and gas line openings closed with masking tape.)

9. Drain coolant from radiator, cylinder block, and heater cores.
10. Lower windows 1/2 inch to stop humidity "sweat" and mold.
11. Remove battery from car, and have charge maintained during period car is stored.
12. Put car up on chassis stands so that tires are off the floor.
13. Apply 10W engine oil to exterior bright surfaces.
14. When car is taken out of storage, install a new fuel filter, check brake system for leaks, and bleed brakes. Clean spark plugs and regap. Install carburetor, fuel pump, and battery, and refill cooling system.

Special consideration should be given when conditions of high humidity, high temperature, or outdoor storage are encountered. Local experience will dictate the additional protection measures in each particular case.

PREVENTIVE MAINTENANCE

18. Periodic Preventive Maintenance Operations

a. Cooling System

Flush every 24 months or 24,000 miles, whichever occurs first, with clear water and add ethylene glycol base coolant.

Replace radiator and heater hoses every two years or 24,000 miles, whichever occurs first.

(NOTE: Supplemental inhibitors or additives claiming to provide increased cooling capability that have not been specifically approved by GM are not recommended for addition to the cooling system. These additives may be detrimental to the efficient operation of the system, and they represent an unnecessary operating expense.)

b. Fuel Filter

Replace fuel filter every 12 months or 12,000 miles.

c. Engine Oil Filter

Replace filter at time of first oil change and every other oil change thereafter.

d. Air Conditioner

Each spring and fall:

1. Clean out insects and dirt from condenser.
2. Check compressor belt tension, Section 6, Note 9.
3. Check overall performance of air conditioner.
4. Check sight glass for full charge of refrigerant.
5. Leak test system for refrigerant and oil leaks.

For complete air conditoner maintenance, see Section 1, Note 42.

MAINTENANCE SERVICE AND SCHEDULE

A program of preventive maintenance is an essential part of vehicle operation. The proper care and maintenance of a new Cadillac as set forth in the Cadillac Owner's Manual will preserve an owner's investment, avoid expensive repairs, and will ultimately result in lasting satisfaction for the Cadillac owner. When new Cadillac cars are brought in for service, the suggested inspections and maintenance services as listed below should be performed by the serviceman. These inspection and maintenance services are those which experience and testing have shown to be the most likely needed services at that particular mileage or time interval for an average owner. However, driving habits, driving conditions, geographical locations, and climatic conditions all influence maintenance requirements.

In addition to these maintenance services, some components of the vehicle may require periodic maintenance depending upon usage.

The Cadillac serviceman should also recommend additional items of maintenance based on conditions such as local weather, owner driving habits, and factory service bulletins.

The maintenance schedule outlined on Pages 0-18 through 0-20 will provide the serviceman with an excellent reference for seasonal maintenance recommendations as well as regular inspections and maintenance services.

MAINTENANCE SCHEDULE

INTERVAL	SERVICE TO BE PERFORMED
Every four months or 6,000 miles	Change engine oil. Oil change may be required every 2 months or 3,000 miles if car is driven under severe operating conditions. Check brake fluid level. Check power steering fluid level. Check battery electrolyte level. Check transmission fluid level. Check axle fluid level. Check windshield washer fluid level. Check coolant level in overflow reservoir. Lubricate accelerator linkage. Lubricate door hinges. Lubricate transmission shift linkage. Lubricate fuel filler door hinge. Wipe off any accumulation of dirt or contamination on hood latch parts and apply lithium grease to latch pilot bolts and latch locking plate. Apply light engine oil to all pivot points in release mechanism, as well as primary and secondary latch mechanisms. Check operation of hood latches. Apply a few drops of light oil to all moving joints of the hood hinges. Lubricate parking brake cable guides and linkage. Change air conditioning charge and condition of hoses. Check power steering lines and hoses for leaks, deterioration and chafing. Check brake lines for leaks. Inspect brake hoses for cracking, abrasions, cuts or tears in the outer covering. Check tires for damage, wear and proper inflation. Check condition of wheels. Inspect complete exhaust system for broken or damaged parts, deterioration, broken seams or loose connections which may cause leaks. Replace or adjust as required. Whenever a new muffler is installed, all pipes and resonators rearward of that muffler should be replaced. Check condition and tension of drive belts – replace at 24 month/24,000 mile intervals. Inspect front and rear suspension and steering linkage. Replace damaged seals and add special lubricant if required. Clean crankcase ventilating breather on left rocker arm cover. Clean battery terminals. Check parking and service brake pedals for travel. Check for fuel, water, and oil leaks. Apply lithium grease to hood bumpers, front and rear. Check steering column lock for proper operation.

MAINTENANCE SCHEDULE (Cont'd)

INTERVAL	SERVICE TO BE PERFORMED
Every four months or 6,000 miles (Cont'd.)	Check lap and shoulder belts for damage and for proper operation. Turn steering wheel from stop to stop and check for excessive free play or any changes in steering action. Check wipers and washers for operation and blade alignment. Check defrosters for proper air flow to windshield. Test drive car and evaluate need for wheel alignment and balance. Test drive car and evaluate brake system performance. Check holding ability of parking brake and transmission "Park" position separately. Check all window glass to insure that no visibility or safety hazard exists. Check all instrument panel illuminating and warning lights, seat belt reminder light and buzzer, ignition key buzzer, interior lights, license plate lights, side marker lights, headlamps, parking tail lamps, brake lights, turn signals, backup lamps, and hazard warning flashers. Check shift pointer to insure that it indicates shift position selected. Check starter safety switch by placing the transmission in each of the driving gears while attempting to start the engine. The starter should operate only in the Park ("P") or Neutral ("N") positions. Blow the horn to be sure that it works. Check to see that seat back latches are holding by pulling forward on the top of each folding seat back. (Doors must be closed on power door lock equipped cars.) Check rearview mirrors and sun visors to insure that friction joints are properly adjusted so mirrors and sun visors stay in the selected position. Check door latches for positive closing, latching, and locking. Check to make sure hood closes firmly by lifting on the hood after each closing. Check also for broken, damaged, or missing parts which might prevent secure latching. Check that head restraints adjust properly in the up detent positions, and that no components are missing, damaged, or loose.
First 4 months or 6,000 miles only	Torque carburetor-to-manifold mounting screws.
Every 6,000 miles	Rotate tires. Check disc brake pads. Replace spark plugs (if using leaded fuels).
At first four months or 6,000 miles – then at 12 months/12,000 mile intervals.	Set idle speed, ignition timing, and dwell. Check choke for free operation. Check operation of thermostatically controlled air cleaner.
At first oil change and every second oil change thereafter.	Change engine oil filter.
Every 12 months or 12,000 miles.	Check brake linings for wear. Clean, inspect or replace, if necessary, Positive Crankcase Ventilation system hose, fittings and attaching parts. Check thermal vacuum switch for proper operation. Inspect spark plug wires (beginning at 24 months or 24,000 miles). Replace spark plugs (if unleaded fuels are used) Inspect distributor points. Rotate distributor cam lubricator 1/2 turn. Apply cam lubricant. Change fuel filter. Inspect carburetor air cleaner element. Replace if necessary. Tighten rocker arm cover screws.

MAINTENANCE SCHEDULE (Cont'd)

INTERVAL	SERVICE TO BE PERFORMED
Every 12 months or 12,000 miles. (Cont'd.)	Check headlight aim. Check throttle linkage for damaged or missing parts, interference or binding. Check operation of washer fluid monitor. Torque body bolts to specification. Check exhaust gas recirculation valve for proper operation. Check idle stop solenoid for proper operation. Check front bumper Energy Absorbing Devices for proper clearances and impact protection readiness. Check underside of car for excess dirt (mud, gravel, tar, etc.) paying particular attention to propeller shaft, wheels, brake drums and disc brake components. Inspect cooling system wash radiator cap and filler neck, and pressure test cap and system. Tighten hose clamps as necessary. Clean exterior of radiator core and A/C condenser.
When Replacing Brake Linings (Rear on Eldorado, Front on Others)	Clean, repack, and adjust wheel bearings.
Every 24,000 miles.	Check final drive boots and output shaft seals – Eldorado only. Replace air cleaner element.
Every 24 months or 24,000 miles.	Clean and oil clock. Replace positive crankcase ventilation valve. Replace radiator and heater hoses. Flush cooling system and refill with ethylene glycol base coolant solution. Replace distributor points and cam lubricator. Clean distributor cap and wires. Inspect AIR system hoses and connections. Replace all engine drive belts. Adjust as necessary. Inspect evaporative loss control system for leaks. Check canister for cracks – replace canister filter. Inspect fuel tank, cap and lines for leaks. Check engine compression.
Every 100,000 miles.	Replace transmission fluid and filter. In severe usage situations, replace every 50,000 miles.

ENGINE OIL CHANGE INTERVAL AND VISCOSITY CHART

ENGINE OIL RECOMMENDATION

Use only high quality oils intended for service "SE". The chart below will serve as a guide for selecting proper oil viscosity. Change oil every 4 months never to exceed 6,000 miles.

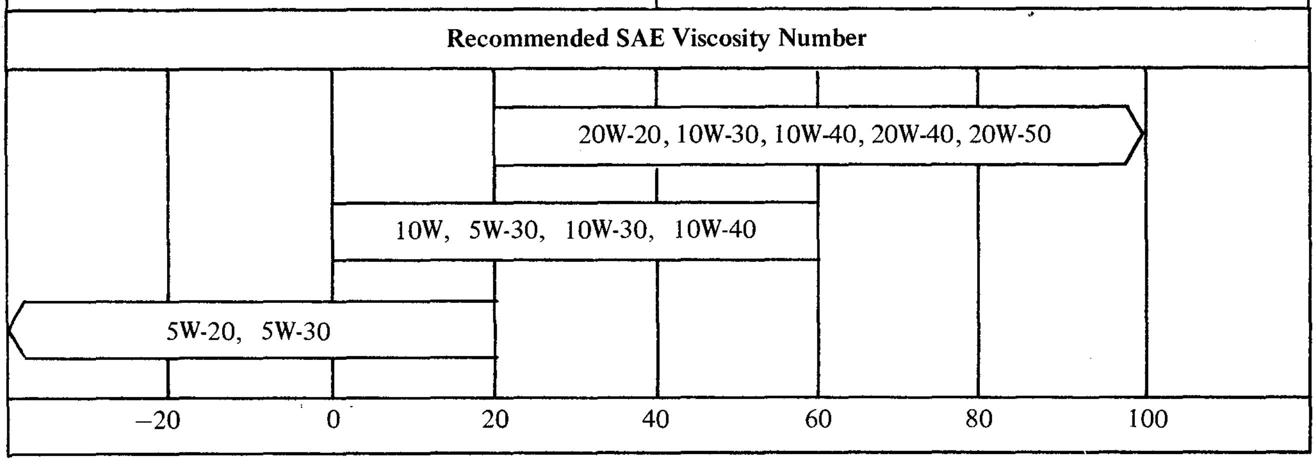
Change oil each 2 months or 3,000 miles, whichever occurs first, under the following conditions: Driving in dusty areas, trailer towing, extensive idling, short trip operation (engine not thoroughly warmed up).

OIL VISCOSITY PRECAUTIONS

SAE 5W-20 oils are not recommended for sustained high-speed driving.

SAE 30 oils may be used at temperatures above 40°F.

SAE 5W-30 viscosity oils recommended for vehicles normally operated in Canada.



Temperature range anticipated before next oil change, °F.

FLUID CAPACITIES

All Series Unless Otherwise Noted	U.S. Measure	Imperial Measure
Engine Oil		
All (Except Eldorado)	4 Quarts	3-1/4 Quarts
Eldorado Only	5 Quarts	4-1/4 Quarts
When Filter is Changed		
All (Except Eldorado)	5 Quarts	4-1/4 Quarts
Eldorado Only	6 Quarts	5 Quarts
Cooling System		
With Air Conditioning*	23.8 Quarts	18-1/4 Quarts
With Heater Only*	21.3 Quarts	18 Quarts
75 Series Only	26.8 Quarts	20-3/4 Quarts
Air Conditioner - Refrigerant 12	4 Pounds	4 Pounds
75 Series Only	5-1/4 Pounds	5-1/4 Pounds
Air Conditioner Compressor Oil -		
525 Viscosity	10-1/2 Fluid Ounces	8-3/4 Ounces
75 Series Only	13-1/2 Fluid Ounces	11-1/4 Ounces
Rear Axle (Except Eldorado)	5 Pints	4-1/2 Pints
Final Drive (Eldorado only)	4 Pints	3-1/3 Pints
Gasoline Tank (All Series)	27.5 Gallons (Approx.)	23 Gallons (Approx.)
Turbo-Hydra-matic Transmission		
(Except 693)		
Dry	12 Quarts, 1 Pint	10 Quarts
Pan and Filter Removed	8 Pints, 3 Ounces	6 3/4 Pints
(Eldorado only)		
Dry	13 Quarts, 1 Pint	10-3/4 Quarts
Pan and Filter Removed	11 Pints, 9 Ounces	9-1/2 Pints

*Capacity is increased 2 quarts (1-1/2 Imperial quarts) on cars with Trailer Towing Package.

FACTORY RECOMMENDED FLUIDS

Unit	Fluid Recommendations
Engine Oil	Oils which, according to the label, are intended for service, "SE".
Transmission	Dexron type Automatic Transmission Fluid, Part Number 1051663, or other equivalent quality fluids.
Brake System	Super Heavy duty Brake Fluid, Part Number 5464831, or brake fluids conforming to SAE J-1703 Specifications (SAE 70-R3 may also be used).
Differential (except Eldorado) Final Drive (Eldorado only)	SAE 80 or SAE 90 GL-5 gear lubricant conforming to MIL-L-2105-B specifications. For vehicles normally operated in Canada, use SAE 80 GL-5 gear lubricant.
Controlled Differential	Special rear axle lubricant, Part Number 1050189, or its equivalent.
Power Steering System	Special power steering fluid, Part Number 1050017, or its equivalent.
Steering and Ball Joints	Special steering linkage and front suspension joint lubricant, Part Number 1050411, or its equivalent.
Propeller Shaft Front Slip Yoke (Fleetwood Seventy-Five Sedans and Limousines and Commercial Chassis)	Transmission fluid.
Propeller Shaft Slip Yoke (6B, 6C, 6D)	Outside diameter with transmission fluid. Inside diameter with synthetic oil seal lubricant, Part Number 1050169, or its equivalent.
Battery	Colorless, odorless drinking water.
Radiator	Ethylene glycol base, anti-freeze coolant (50-50 mixture with water).
Engine Fuel	"No-Lead", "Low-Lead", or regular grade gasoline having a research octane number of 91 or higher.
Air Conditioning System Lubricant	525 viscosity refrigeration oil.
Refrigerant	Refrigerant "12".

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TABLE OF CONTENTS

DIAGNOSIS OF PROBLEMS—FRONT A/C—ALL SERIES

1. How to Isolate the Problem

During diagnosis it is important to remember that the 1973 air conditioning and heating system is functionally different than earlier systems in the following manner:

1. Low blower continues to operate in heater mode when in the "OFF" position at all times except when both the engine and the car's interior are cold
2. The "BI-LEVEL" lever setting provides both upper and lower level air simultaneously, otherwise, it operates the same as the "AUTO" position with changes in discharge temperatures and blower speeds.
3. The "DEF" lever setting provides fixed high blower air from the defroster outlets and a bleed out the heater outlet. Otherwise, it operates similar to "HI," in that the air temperature varies depending on the position of the programmer and blower speed remains at fixed high.

To diagnose an air conditioner problem in the

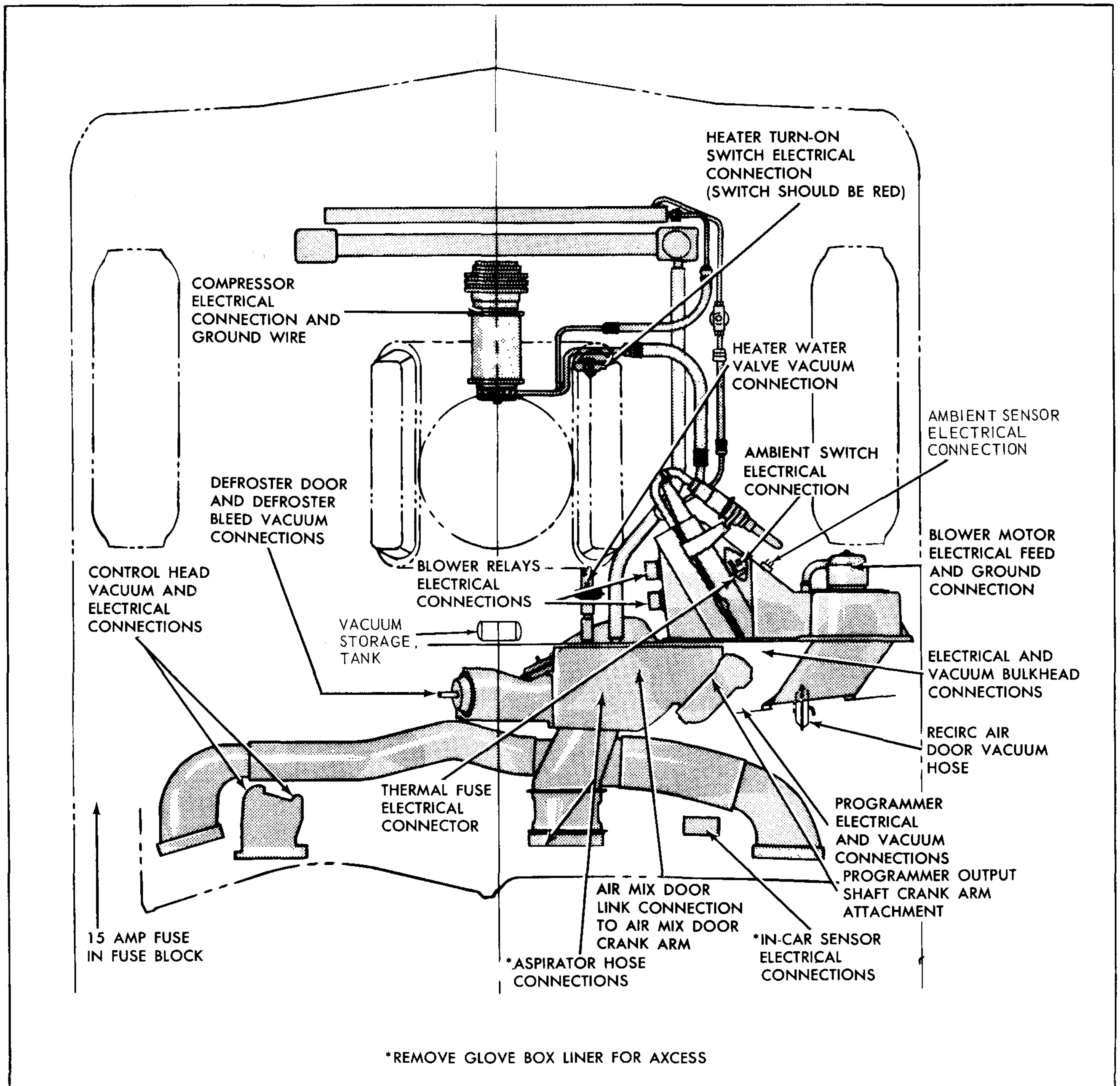


Fig. 1-1 A/C Diagnosis Areas

shortest time and with the least effort, it is essential to follow a logical service procedure. Time spent in conducting a system functional performance test and analyzing the defect in order to isolate it to a specific control function area will be repaid in reduced repair time. A recommended diagnosis procedure follows:

STEP 1 - Attempt to get an accurate, detailed description of the owner's complaint in writing on the repair order. "A/C inop." or "erratic operation" do not provide much information to the repairman.

STEP 2 - To confirm the system defect make a brief check of system operation by sitting in the car and operating the controls, with the engine warmed up and running at 1000 RPM or higher, in the following sequence:

AUTOMATIC TEMPERATURE CONTROL FUNCTIONAL TEST	
CONTROL SETTING	SYSTEM SHOULD OPERATE AS FOLLOWS:
"DEF" DIAL @ 85	Air should be delivered out of defroster outlets at a fixed high blower speed. Some floor bleed out heater.
"BI-LEVEL" DIAL @ 75°	Air should be delivered from both the A/C and heater outlets at a reduced blower speed. Only a small portion of air will come out the defroster outlet.
"HI" DIAL @ 65°	Air should be delivered out the A/C outlets at a fixed high blower speed and cool to cold temperature. The recirculating air door should open (blower noise increases). Door movement will be slow because of vacuum delay plug.
"AUTO" DIAL @ 65°	After 45 seconds the A/C discharge air should drop to 50°F or lower (may be slightly higher in 90°F or above ambients). Recirc air door should close-noise level will drop (except Eldorado).
"AUTO" DIAL @ 85°	Blower speeds should drop (Hi - M_3 - M_2 - M_1 - etc.) and discharge air temperature should increase. Depending on the temperature in the work area, the air delivery mode should change from the A/C outlets to the heater outlets.
"LO" DIAL @ 85°	Air should be delivered at a fixed low blower speed.
"VENT" DIAL @ 85°	Air should be discharged from the A/C outlets at a fixed low blower speed. The A/C compressor should not operate.
"OFF" DIAL @ 65°	Air should be discharged out the heater outlet at a fixed low blower speed. No A/C compressor operation.

During the above tests, be sure to note the following:

a. Check to assure that air delivery is not coming from both the A/C and heater outlets when only one mode is indicated. A split air delivery is indicative of a vacuum leak.

b. Note whether program events (air delivery mode change, blower speed change, recirc air, etc.) occur without change in discharge air temperature. This would indicate the programmer is operating without moving the temperature air door. Check the air mix door link to programmer connection.

c. If neither the program events nor the discharge air temperature change, a faulty vacuum or electrical signal to the programmer or a programmer malfunction is indicated.

d. Failure of a specific vacuum operated door function could indicate a vacuum disconnect of the vacuum diaphragm at that door. See illustrations for locations of the different function doors.

STEP 3 - Perform the easiest checks first! A simple, visual inspection of the easily accessible underhood and instrument panel electrical and vacuum connections will, in many instances, reveal the defect on the spot. The areas indicated in Fig. 1-1 can be inspected without removing any car parts:

STEP 4 - Based on information gained during the functional test performed in step 2, try to relate the problem to one of the following areas:

1. Temperature Control Problems
2. Blower Control Problems
3. Auxiliary Vacuum Problems
4. Refrigeration System Problems

Once a problem has been isolated to one of the areas listed above, refer to that diagnosis section on the following pages. Diagnosis charts and control circuit illustrations are provided. It is of special importance to be familiar with the general description of the major sections of the system as presented in the Theory of Operation section beginning on page 1-17.

STEP 5 - After the problem has been properly diagnosed and the repair made, it is important to run through the brief check listed in Step 2 in order to assure that the system is now performing correctly.

2. Temperature Control Problem Diagnosis

The temperature control circuit consists of the components shown in Fig. 1-2. The primary function of the temperature control circuit is to determine the correct temperature of the air to be discharged into the passenger compartment and to set the air mix door position to accomplish that function. The signal used for this purpose (vacuum to position the programmer vacuum motor) is also used in the blower speed control circuit. and the auxiliary vacuum function circuit. Those uses may be disregarded when dealing with problems which relate only to the temperature control circuit.

Examples of temperature control problems are: "System operates at maximum air conditioning (no heat) or only at maximum heating (no air conditioning)", "Temperature dial does not provide comfort", "Poor heating or poor cooling" Blower cycling and mode cycling are also caused by a malfunction in the

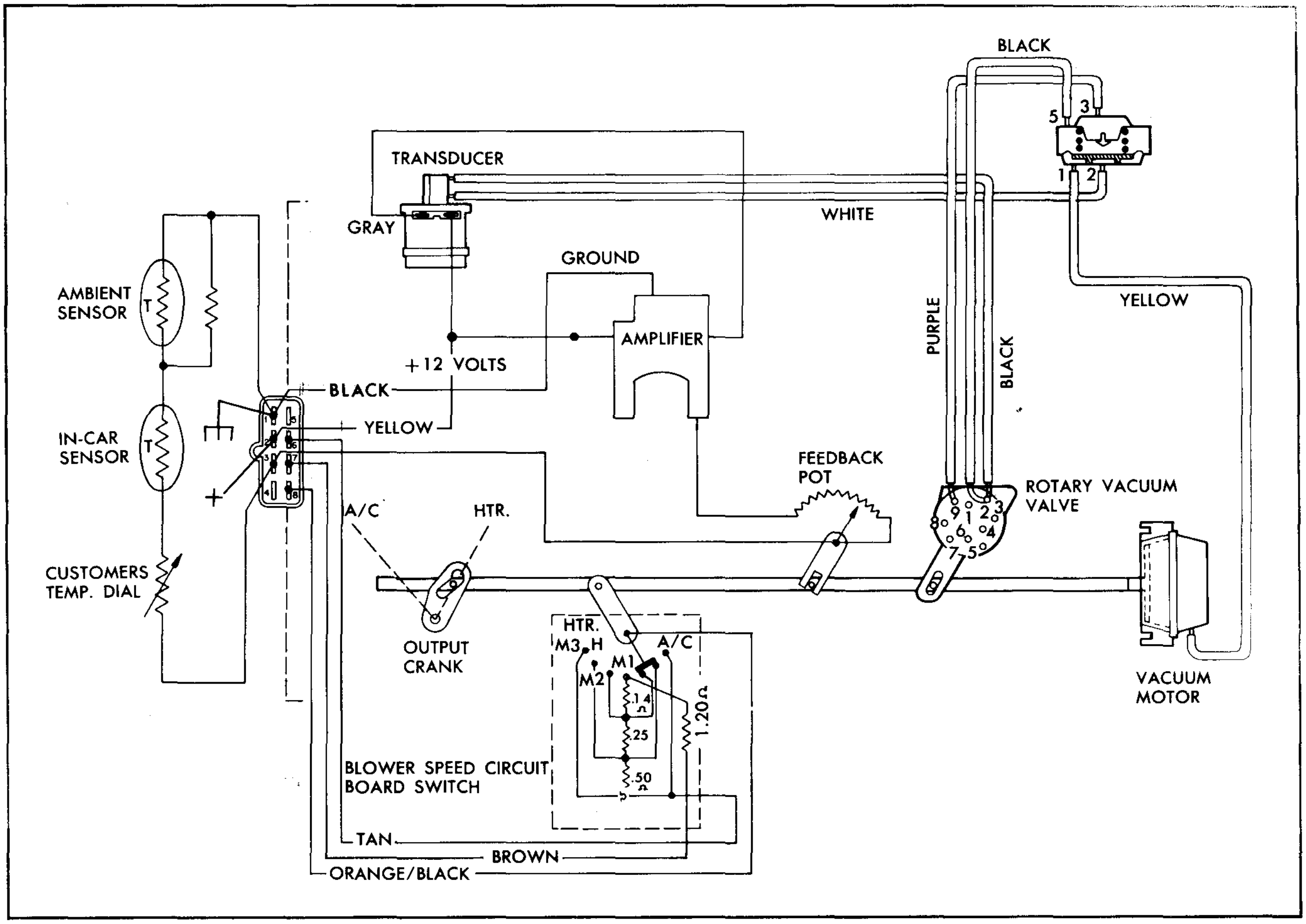


Fig. 1-2 Temperature Control Circuit

temperature control circuit. For a brief, detailed explanation of how the temperature control circuit operates, refer to the operation section on page 1-25.

It is important to separate temperature control circuit problems from refrigeration or heater circuit problems. If the complaint is "poor" or "no" heating or cooling and the programmer moves to both extremes of travel with the air mix door and program functions known to follow, the problem probably lies in the refrigerant or heater water circuits. Refer to that section on page 1-23.

Many temperature control problems result from poor electrical or vacuum line connections. The following relationships may aid diagnosis:

- A disconnected sensor or temperature dial interrupts the electrical signal and drives the programmer to maximum heating.
- A poor sensor connection adds resistance to the sensor string driving the system hotter.
- An open amplifier power feed eliminates the output signal and drives the programmer to maximum heating.
- A disconnected transducer lead drives the programmer to maximum heating.
- A disconnected vacuum hose supplying the vacuum checking relay actuating nipple will lock the relay in an intermediate position.
- A disconnected vacuum hose in the transducer - programmer vacuum motor line will drive the system to maximum cooling.
- A leak in the auxiliary vacuum circuit may reduce the transducer vacuum supply level below control requirements, causing an "off-calibration" or "poor heating" type of complaint.
- A loss of supply vacuum usually results in cold air flow on the floor.

Diagnosis of most of the problems encountered in the temperature control circuit will be greatly aided by use of tester, J-23678. Information on how to use the A.T.C. Tester appears at the end of this section. (Instructions also accompany the tester.)

Specific problems and probable causes are as follows:

SYSTEM OPERATES ONLY AT MAXIMUM AIR CONDITIONING

This can be a vacuum or electrical problem. The problem can be separated into problems of erroneous signal external to the programmer or internal programmer malfunctions. With the system operating, disconnect the ambient sensor electrical connector, and observe the programmer movement through the slot at the bottom of the programmer cover. If the programmer remains in the maximum air conditioner position, remove the multiple vacuum connector and check for supply vacuum at the black hose. If no (or low) vacuum supply, check for leaks or disconnects in vacuum hose assembly. If vacuum supply is okay, programmer is malfunctioning. Remove programmer cover and inspect for obvious disconnects. If no programmer defect is obvious, use tester J-23678 to analyze and correct problem.

If the programmer moved to the maximum heater position when the electrical connector was removed, the defect is external to the programmer. Check the following items:

1. Shorted in-car sensor or ambient sensor.
2. Shorted or miscalibrated temperature dial.
3. A short in the sensor circuit of the wiring harness.

SYSTEM OPERATES ONLY AT MAXIMUM HEATING

This is usually an electrical problem. Problems outside of the programmer can generally be separated from internal programmer malfunctions. To do this, set the temperature dial to 65° and the control lever to the "Vent" position with the system operating. Observe the programmer through the slot located in the lower half of the programmer cover to see if the programmer now moves to the maximum air conditioning position. If the programmer does move, the problem is one of the following areas:

1. Disconnected or defective in-car sensor.
2. Disconnected or defective ambient sensor.
3. Open circuit or backed-out terminal in the wiring harness sensor string circuit.
4. Disconnected or back-out terminal in the 3-way connector located under the instrument panel on the R.H. side of car near the programmer.

If the programmer did not move when the control was put to "Vent", the problem lies in one of the following areas:

1. Disconnected or defective temperature dial.
2. Disconnect or open in ground circuit (black wire) between control head and programmer.
3. No electrical power to programmer (yellow wire).
4. No ground at amplifier.
5. Defect within programmer assembly.

Use Tester, J-23678, to analyze and correct the above problems.

SYSTEM FLUCTUATES BLOWER SPEEDS and/or MODE SHIFTS DURING ACCELERATION

1. Defective vacuum checking relay (inside programmer).
2. Leaking programmer vacuum motor.

It is possible to distinguish between the two above items. With the system operating and the programmer cover removed, reinstall the vacuum and electrical connectors, and perform the following steps:

a. Remove the programmer electrical connector to force the programmer to maximum heating (full vacuum).

b. Remove the vacuum hose assembly connector. The programmer should remain in the maximum heat position. If it does not, repeat Step a, and then pinch the programmer vacuum motor supply hose with a pair of needle-nose pliers. If the programmer still moves, the vacuum motor is leaking. If the programmer does not move, the checking relay is defective.

c. If the original complaint was mode shifts without blower change, the check valve portion of the checking relay is probably defective.

DIAL SETTING DOES NOT PROVIDE COMFORT

The best approach to solving problems of the "off calibration" variety, is to use Tester, J-23678, to check and reset calibration on all of the following parts:

1. The temperature dial.
2. The feedback potentiometer in the programmer.
3. The temperature door link adjustment.
4. The sensor string.

(NOTE: Check to assure that in-car sensor aspirator hose is attached at both the in-car sensor and the aspirator and not kinked in routing.)

Refer to the instruction sheet included with the Tester or the section on System Adjustments for procedures on checking and calibrating the above items.

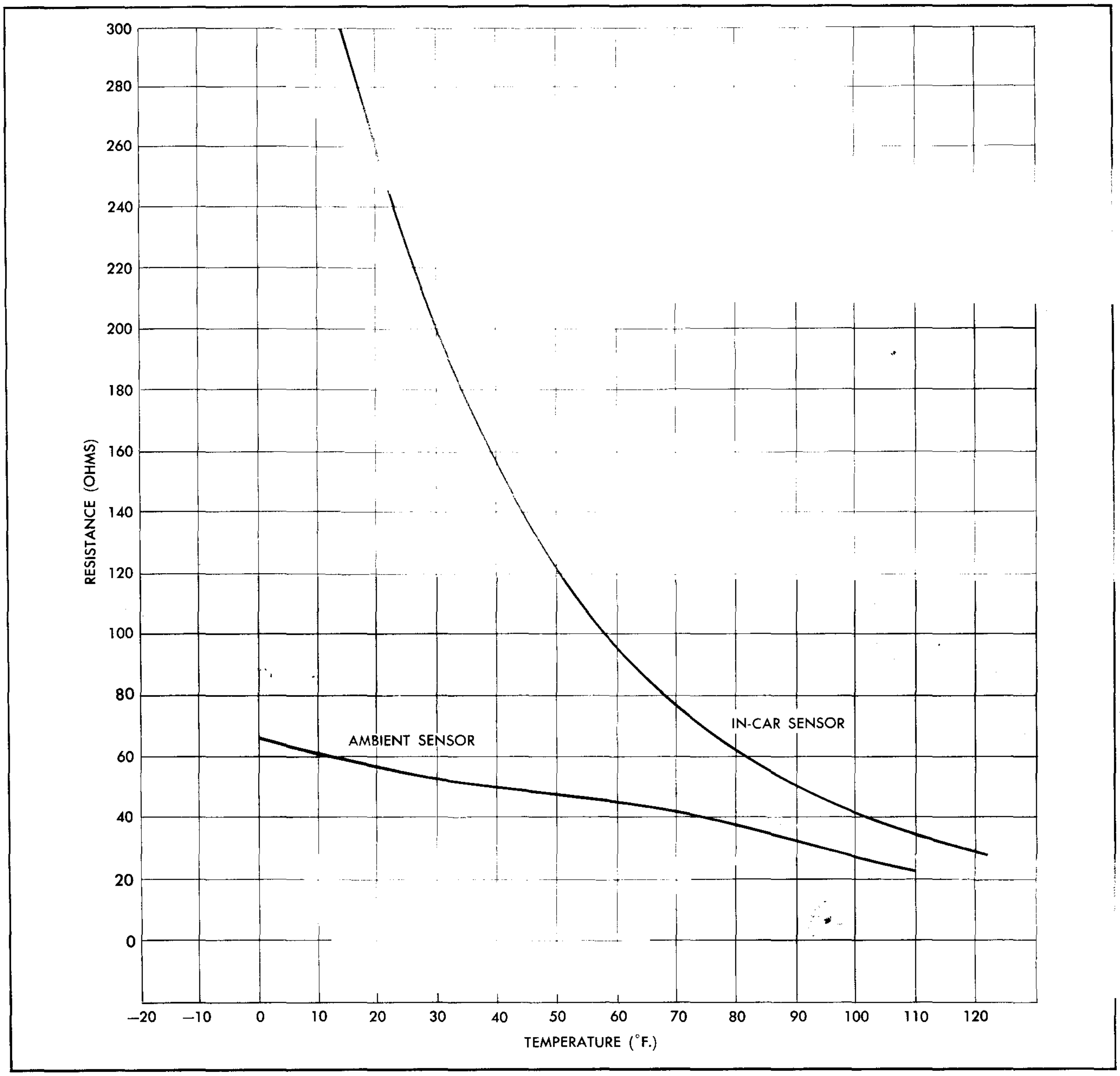


Fig. 1-3 Resistance Graph of Sensors

BLOWER CYCLING AND MODE CYCLING

Erratic system performance may be caused by poor electrical connections, "cold" solder joints, or a defective sensor or amplifier. The problem may be intermittent and occur from the shock of going over road bumps. Such a problem may be accompanied by a clicking or buzzing of the transducer. To isolate the problem area, "rap" the areas around the sensors, control head, and programmer, and shake the wires attached to those areas. Listen for buzzing or clicking of the transducer. If the problem cannot be pinpointed by transducer buzzing, remove the programmer cover, (reinstall the vacuum and electrical connectors) and attach a good voltmeter to the transducer output terminal (grey wire). Repeat the rapping and wire shaking, and observe the voltmeter for violent, erratic voltage fluctuations. Replacement of parts or resoldering of terminals may be necessary. The sensors may be individually checked to the sensor resistance curve, Fig. 1-3.

(NOTE: Some system cycling may also occur and is normal if the temperature dial is moved in large increments. Instruct owner of this, and explain system operation.)

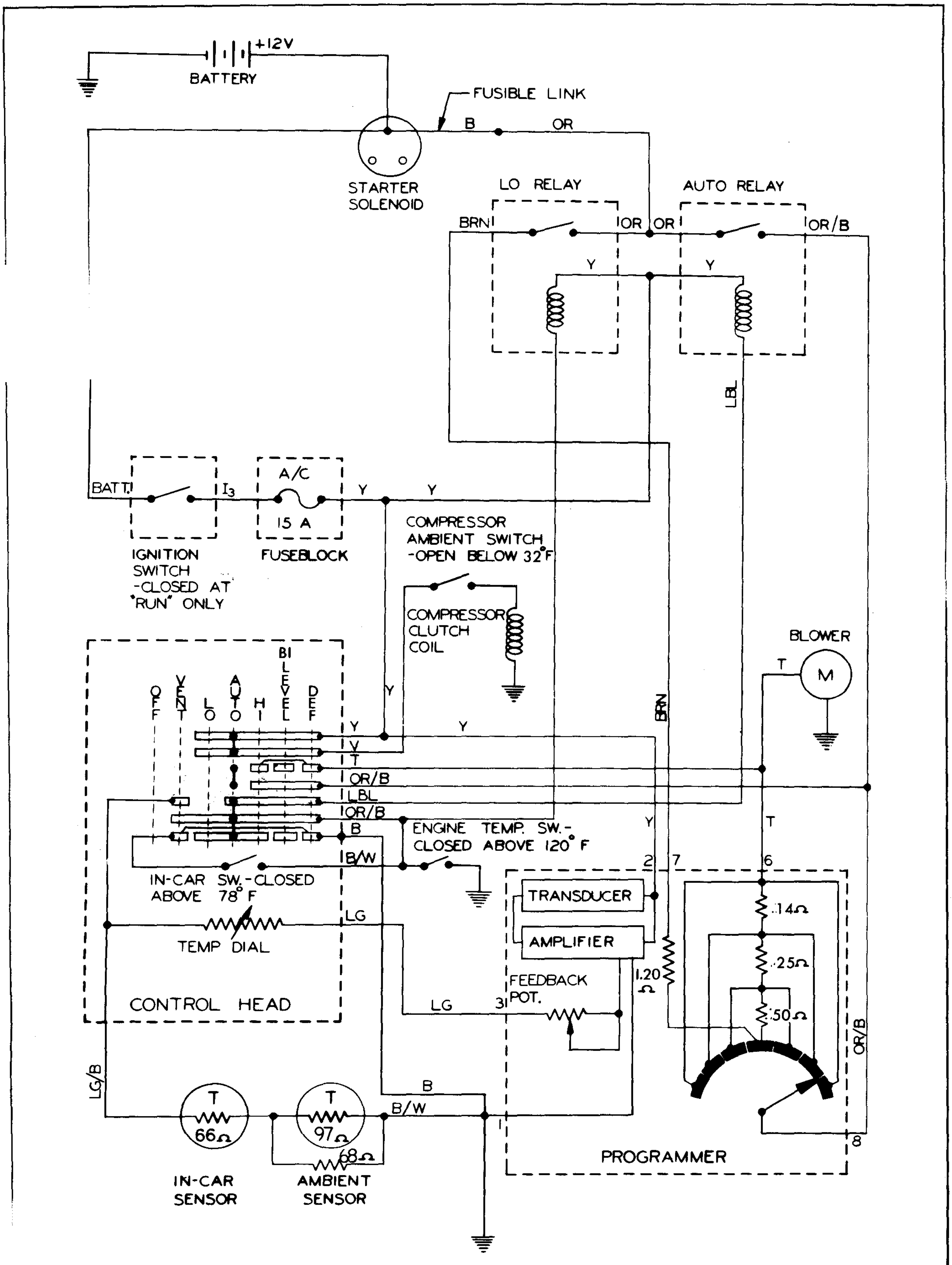


Fig. 1-4 Blower Control Circuit

INSUFFICIENT HEATING OR COOLING

This problem may be caused by a control system malfunction or by the refrigerant or heater systems. Determine first which area to pursue:

1. Check for compressor clutch actuation (no cooling). If not operating, refer to Note 6 for diagnosis of low refrigerant detection system.
2. Check for clear sight glass and cold suction line (no cooling).
3. Check engine coolant level (no heating).
4. Check temperature of heater hoses by feel with engine hot to see if hot water is entering the heater core (no heating).
5. Check for proper air flow at the "Auto" and "Hi" lever settings. (Improper air flow may be a blower relay problem, a blocked air passage, or a disconnected air hose.)

If a refrigeration problem exists, refer to the refrigeration diagnosis section on page 1-12. If the problem appears to be caused by the temperature control system, locate problem area using Tester, J-23678, or as specified elsewhere in this section. Also check air mix door link adjustments.

BLOWER SPEEDS AND MODE SHIFT OCCURS WITHOUT TEMPERATURE CHANGE

Check connection of air mix door link to programmer shaft and to air door crankarm.

3. Blower Control Circuit Problem Diagnosis

The components and electrical circuits that make up the blower control circuit are shown in Fig. 1-4. Blower control can be divided into two separate categories, blower turn-on and blower speed control. Blower turn-on is accomplished when a ground path is completed for either the "Lo" relay coil or the "Auto" relay coil. Relay coil grounds are completed by (a) the heater turn-on switch which provides delay for heater water warm-up in winter operation, (b) the in-car switch which provides immediate turn-on in summer operation, or (c) manual override in the "Vent" and "Def" settings. Blower speed control is accomplished by actuating only the low blower relay in the "Off", "Vent", and "Lo" positions, by selective use of the resistors on the blower circuit board in the "Auto" and "Bi-Level" lever settings, or by a high blower override circuit in the "Hi" and "Def" lever positions. It should be noted that the system air doors are always positioned to allow delivery of air into the passenger compartment. Particulars of the blower control circuit are explained in more detail in the theory of operation section on page 1-25. Problem descriptions and probable causes are listed in the following diagnosis chart:

SYSTEM OPERATES ONLY AT LOW BLOWER

1. Electrical disconnect at "Auto" blower relay.
2. Failed "Auto" blower relay.
3. Backed-out terminal or poor connection at six-way connector (located near programmer), at programmer, or at control head. Trace "Auto" blower circuit using electrical wiring diagram, Fig. 1-4 or 1-43.
4. Open in "Auto" blower circuit wiring.

Refer to wiring diagram, Fig. 1-4.

NO BLOWER OPERATION IN ANY LEVER SETTING

1. Electrical disconnect at blower motor or at radio capacitor in series with blower feed.
2. Blown or defective 15 amp. A/C-heater fuse.
3. Stalled blower motor.
4. Open circuit in wiring harness to blower motor.
5. Disconnect at six-way connector (near programmer).

NO BLOWER IN OFF, VENT OR LO SETTINGS

1. Disconnect at "Low" blower relay.
2. Failed "Lo" blower relay.
3. Open low speed resistor on programmer.
4. Backed-out terminal or poor connection at six-way connector (located near programmer) or at programmer. Trace lower blower circuit using electrical wiring diagram, Fig. 1-42.
5. Open in low blower circuit wiring. Refer to wiring diagram, Fig. 1-55.

OPERATES AT LOW BLOWER ONLY EXCEPT IN "HI" AND "DEF"

1. Defect in programmer wiper contacts or board.
2. Backed-out terminal or disconnect at programmer electrical connector.
3. Open in programmer internal wiring.

BLOWER OPERATION ONLY IN "HI" OR "DEF"

1. Electrical disconnect at programmer (system will also operate only at maximum heat).

BLOWER SPEED VARIES IN "HI" AND "DEF"

1. Defective wipers or board in control head circuit board switch.
2. Open in control head wiring harness.
3. Open in by-pass circuit in wiring harness (refer to electrical circuit diagram, Fig. 1-55).

BLOWER OPERATES WITH IGNITION OFF

1. Defective blower relay (closed contacts).

BLOWER SPEEDS SKIPPED IN "AUTO" SETTING

1. Open resistor on programmer blower circuit board.

NO HEATER TURN-ON IN COLD WEATHER EXCEPT IN "VENT" AND "DEF"

1. Electrical disconnect at heater turn-on switch (located at front of R.H. cylinder head).
2. Defective heater turn-on switch (will not close). Check by grounding switch feed wire.
3. If problem persists, refer to electrical circuit diagrams for wiring discontinuity.

NOTE: If problem does not occur in shop, it is probable that the system is turned on by the in-car sensor. Disconnect control head electrical connector to disarm the in-car switch. If the blower turns off (with the engine warmed up), ground the heater turn-on switch feed wire. If the blower now turns on (in low blower speed), the heater switch is probably defective.

IMMEDIATE HEATER TURN-ON IN COLD WEATHER

1. Defective (closed) heater turn-on switch (remove and check cold).
2. Defective (closed) in-car switch.
3. If problem persists, refer to electrical circuit diagram, and trace wiring continuity.

A/C DELAYED IN HOT WEATHER UNTIL ENGINE WARMS UP (UNLESS CONTROL LEVER IS IN "VENT" OR "DEF")

1. Defective (open) in-car switch.
2. Open in control head wiring harness (in-car switch circuit).
3. If problem persists, check wiring continuity in the in-car switch circuit. Refer to the wiring diagram, Fig. 1-4.

4. Auxiliary Vacuum Problem Diagnosis

Auxiliary vacuum functions are defined as those vacuum circuits in the automatic temperature control system which do not affect the temperature of discharge air. Specifically that would include all vacuum functions except the transducer, relay portion of the vacuum checking relay, and the programmer vacuum motor. Included in this section is one auxiliary electrical circuit, the compressor actuation circuit. A list of the auxiliary circuits is as follows:

1. Upper mode door vacuum circuit.
2. Lower mode door vacuum circuit.
3. Defroster bleed vacuum circuit.
4. Defroster door vacuum circuit.
5. Recirc door vacuum circuit.
6. Heater water valve vacuum circuit.
7. Auxiliary vacuum circuit check valve.
8. Compressor electrical circuit.

Refer to the controls portion of the theory of operation section for a brief explanation of each function and separate circuit diagrams.

Because of the relative simplicity of each of the auxiliary vacuum circuits, the best diagnostic aid will be a clear understanding of the type of problem or complaint which would result from a malfunction in any of the individual circuits. Once the problem has been isolated to a specific circuit, diagnosis will generally consist of checking vacuum connections at one or two points. The following chart presents the types of problems most likely to be encountered in each of the auxiliary circuits. For more complex problems a procedure to completely qualify the vacuum system is presented in the last block of the diagnosis chart.

It should be noted that because of the interrelationship of the vacuum circuits, a leak in one circuit may reduce the vacuum supply to another circuit sufficiently to cause a malfunction of the second circuit. For example, a water valve vacuum hose disconnected may prevent the mode doors from moving full travel causing a split mode condition.

UPPER AND LOWER MODE DOOR ACTUATION PROBLEMS

The most likely malfunctions would be "no air conditioner operation" and "split mode operation". Vacuum is required to get air conditioner mode. Check the hose connections at the mode door upper and lower vacuum actuators. Split modes may occur because of malfunctions in either the upper or lower door circuit, or because of leaks in other auxiliary vacuum circuits. It is recommended that the external vacuum circuit test procedure listed later be used to isolate mode door vacuum problems.

DEFROSTER BLEED PROBLEMS

Actuation of the side (bleed) port of the defroster diaphragm is delayed by a porous flow plug inserted in the yellow-coded vacuum hose. Complaints relating to defroster bleed operation will generally be of two types:

1. No defroster bleed. Check hose connection at defroster bleed nipple of defroster vacuum actuator. If connections are satisfactory, porous plug is probably too restrictive. Replace plug. (Before installing new plug, check for vacuum in yellow line; and apply hose to nipple, without the plug, to check bleed door operation.)
2. Rapid fogging of windshield when heater turns on. Either there is no porous flow plug or installation of the plug is incorrect.

DEFROSTER DOOR ACTUATION PROBLEMS

The most common problem to be expected in this circuit would be "no air out of defroster outlets in "Def" setting". Vacuum to the defroster actuator is required for defroster operation.

1. Check hose connection (blue) at defroster actuator.
2. Check for vacuum at the control head purple hose.
3. If system stays in A/C mode at "Def", check vacuum circuit to determine why mode override did not occur. If problem persists, see vacuum circuit test page 1-11.

RECIRC AIR DOOR ACTUATION PROBLEMS

The most likely problem to be encountered will be "no recirc air in Hi lever setting". Vacuum is required to obtain recirc air. Check hose connection at recirc air door. Remove vacuum delay plug to check for adequate vacuum at "Hi" setting and 65° dial. If vacuum is available but door won't move with plug in circuit after approximately 3 minutes, replace plug.

HEATER WATER VALVE CONTROL PROBLEMS

The water valve is a normally open valve requiring vacuum to close off water flow. It would be very difficult for a customer to recognize a problem in the water valve circuit by "no heater water shut-off"; however, a leak in that circuit may manifest itself by reduced vacuum levels available in other vacuum functions.. The most likely such complaint would be a split mode delivery. Use the external vacuum circuit test presented below to isolate vacuum problems.

AUXILIARY VACUUM CIRCUIT CHECK VALVE PROBLEMS

The check valve for the auxiliary vacuum circuit is located in the programmer checking relay assembly. A malfunction of this check valve will probably result in complaints of loss of a specific function (such as "A/C shuts off") during accelerations or mountain driving. The check valve may be checked with the system operating by disconnecting and plugging the black hose feeding the programmer checking relay. The vacuum functions (a vacuum gage in the purple hose or the system in A/C mode) should hold. If they do not hold, reinstall the black hose, and pinch the purple hose. If the functions now hold, the check valve is bad. If the functions continue to leak down, there is a circuit leak further upstream. Use the auxiliary vacuum circuit test below to locate the leak.

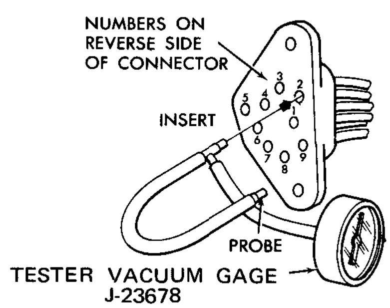
COMPRESSOR ELECTRICAL PROBLEMS

Malfunctions in the compressor electrical circuit would result in complaints of "no cooling", or "insufficient cooling". Perform the following checks:

1. Blown thermal fuse or disconnect at thermal fuse. Refer to Note 6.
2. Blown 15 amp fuse in fuse block.
3. Electrical disconnect at compressor clutch coil or clutch coil ground.
4. Electrical disconnect at compressor ambient switch. (Also disconnects ambient sensor which will bias the programmer to max. heat.)
5. Electrical disconnect at the three-way electrical connector inside the car, to the right of the programmer.
6. Backed-out terminal or disconnect at the control head electrical connector.
7. Defective compressor ambient switch.
8. Open in wiring harness. Refer to electrical circuit diagram, Fig. 1-4.

AUXILIARY VACUUM CIRCUIT TEST PROCEDURE

Remove car vacuum harness plug from programmer valve, which should direct all airflow to floor except for defroster bleed air. Connect tee with short hose and union to J-23678 tester vacuum gauge hose as shown in sketch at right, inseating tee in Part No. 2 of harness plug and probing each of the other ports in turn. Make sure that control head lever is set as specified for each step, and cover up probe on Ports 3 and 9 when called for, to seal off other circuit branches. For each step, full vacuum should be read after actuator-travel is completed.



Control Lever	Probe Port:	Hose Color	Cover Up	Other Hoses In Circuit	Action Expected
Bi-Level	None	Black	Probe	Yellow	Defroster door moves to "bleed" position
Bi-Level	1	White	None	None	Hot water valve closes - Check air in "max. heat"
Bi-Level	3	Red	Port 9	Purple, Tan	Lower mode door moves to A/C position
Bi-Level	4	Orange	None	None	Recirc. door opens - 1-2 min. delay
Lo	5	Chartreuse	Port 9	Purple	Checks control head vacuum leakage
Lo	6 or 8	Green	None	None	Upper mode door moves to A/C position
Hi	7	Dark Brown	None	Tan	Lower mode door moves to A/C position
Def	9	Purple	Port 3	Red, Dk. Blue	Defroster door moves to full "DEF" position

A low vacuum reading in any step indicates a leak in control head valve or in the hoses and components listed in that step. If some function is missing even though full vacuum is available, reconnect harness plug to programmer and check vacuum at extreme end of hoses involved, to distinguish between a pinched hose and a mechanical bind in actuator or door.

5. Refrigeration Problem Diagnosis

The sole function of the refrigeration system is to maintain the evaporator core cooling surfaces at 32°F. when refrigeration is required. A properly-operating refrigeration system will do this, if engine speed is sufficient and the heat load on the system is not excessive. A refrigeration problem exists when there is a defect in one of the refrigeration components or in the overall system which interferes with this function. In most cases, the defect will result in higher-than-normal core temperature and loss of effective cooling; in a few specific cases the core will operate at a temperature lower than 32°F. and condensate in the core will freeze and block air-flow, again causing a loss of cooling.

It is important to separate refrigeration problems from temperature control problems. This can be done simply during the brief lever setting check prescribed at the beginning of the diagnosis section. Proceed as follows:

1. Set lever at OFF-VENT-LO-AUTO-HI-BI-LEVEL-DEF and check for proper system operation, as described earlier.
2. If system operates properly, return lever to AUTO and set dial at 65°.
3. Install thermometer in center air conditioner outlet. Wait approximately one minute. Thermometer should read 40° to 50° unless temperature or humidity of test area are excessively high.
4. If the discharge temperature is significantly higher than 50°, disconnect ambient sensor electrical connector. Check to assure that the air-mix door link arm is pivoted fully to the "Max" A/C position.
5. If the discharge air temperature drops to 50° or below as a result of disconnecting the sensor, the problem belongs in the Temperature Control category.
6. If the temperature does not change and is still significantly higher than 50°, a refrigeration problem exists.

Many refrigeration problems can be readily diagnosed without connecting the refrigeration gage set or performing the more extensive Cooling Capacity Performance Test listed in the standard service procedures. Defects causing a problems of this sort are listed in the following chart:

NO REFRIGERATION OR INSUFFICIENT REFRIGERATION

Gage set usage not required for diagnosis.

1. No voltage to compressor clutch - check thermal fuse. Refer to Note 6.
   Check compressor electrical circuit, including compressor ambient switch.
   Check 15 amp A/C-heater fuse.
2. Compressor seized - clutch plate slips -
   Clutch plate moves rearward and engages pulley but pulley cannot drive it.
3. Compressor belts slipping.

The following chart lists defects that require connecting the gage set and running the Cooling Capacity Performance test (Note 46).

REFRIGERATION DIAGNOSIS CHART

Observe refrigeration system in areas listed below while engine operates at 2,000 RPM with control lever in "HI" and temperature dial at 65. Blower motor should be disconnected when required in chart.

System Defect	Outlet Air Temp. (in "HI")	Sight Glass	Head Pressure At Ambient Temperature	Evaporator Pressure	Evaporator Outlet Pipe (Ahead of STV)	Oil Bleed Line	System Correction
-No Defect- Normal	40-50°	Clear Bubbly with blower off	Temperature 70 | 80 | 90 | 100 160 | 190 | 220 | 250 200 | 230 | 260 | 290	29-32 P.S.I. Maintains press with blower disconnected	Cold	Warm Gets cold with blower dis-connected	
Low Charge *	Warm	Foamy or Bubbly	Low	Normal to Low	Warm	Cold	Find and repair leak. Recharge
Lost Charge *	Warm	Clear	Very low	Very low	Warm	Warm	Find and repair leak. Recharge
Expansion * valve inlet screen** plugged Capillary ** broken (Valve * Closed).	Warm	Clear	Low	Low Goes to vacuum with blower disconnected	Warm	Cold - Equalizer line also cold Warm	Clean or replace inlet screen Replace X-valve
Capillary bulb-poor contact to pipe or bad insulation	Normal to Warm	Clear	Normal	High	Cold to Cool	Warm	Reclamp bulb at 3 o'clock location. Replace in-sulation
Suction throttling valve-setting too high	Warm	Clear	Normal	High Won't pull down with blower disconnected	Cool to Warm	Cold at low Ambient temp Warm at high Ambient temp	Replace STV
STV-Shut due* to loss of ** bellows vacuum or binds shut	Warm	Foamy to Bubbly	Normal	High	Warm	Warm Equalizer Line cold	Replace STV (Note: car with this de-fect will not take full charge)
STV - Stuck * Open	Cold May lose air flow on humid days	Clear	Low	High or Low Goes to vacuum with blower disconnected	Cold	Warm	Replace STV
Restriction in * receiver (Liquid line cold)	Warm	Bubbly	Low	Low	Cool or Warm	Cool or Warm	Replace re-ceiver dehy-drator
Over charge (blows relief valve on hot days)	Normal	Clear	High	Normal	Cold	Warm	Recharge to specification

*Can cause superheat switch to close and shut off compressor.

**Run test at least twice. Allow system to warm up and equalize before repeating. If condition doesn't recur, system has excess moisture causing ice to form in valve. Discharge, evacuate for 1/2 hour, recharge. Change dehydrator if necessary.

Listed below are a number of defects which will cause a relatively minor loss of capacity.

1. Excess bugs, leaves, etc. on condenser - Will cause higher-than-normal head pressure.
2. Excess oil in system.
3. Air in system - Will cause higher-than-normal head pressure. Will also cause internal corrosion of parts.

(NOTE: Let system stand inoperative overnight. With the same gage, check first the low side pressure and then the high side pressure. If the high side pressure is significantly higher than the low side pressure, there is probably air in the system. Purge, evacuate and re-charge.)

6. Low Refrigerant Flow Detection System Diagnosis

A thermal fuse and superheat switch, designed to protect the air conditioning compressor against damage when the refrigerant flow to the compressor is inadequate due to low or lost charge or valve malfunction, is incorporated on all cars.

During normal operation, current flows through the control head switch, ambient switch and thermal fuse to the clutch coil to actuate the compressor clutch. If a partial or total loss of refrigerant occurs in the system, the contacts in the superheat switch close, as the switch senses low system pressure and high suction gas temperature. When the contacts close, current flows to energize a resistor-type heater in the thermal fuse.

The resultant heat melts the fuse link and the circuit to the compressor clutch coil opens. Compressor operation ceases and damage due to low refrigerant flow is prevented. The superheat switch must be closed for approximately 2 minutes to blow the fuse.

Before thermal fuse replacement, the cause of the refrigerant loss must be corrected.

DIAGNOSIS OF LOW REFRIGERANT FLOW DETECTION SYSTEM

Compressor will not operate if thermal fuse is blown. To check for blown fuse, remove harness connector and short between terminals "B" and "C" in the harness connector. If compressor now operates but did not before, thermal fuse is blown; proceed with Step 1. If compressor does not operate refer to compressor electrical problems on Page 1-11.

1. Inadequate Refrigerant Charge - Check for clear sight glass as described in Note 43. If refrigerant is low, eliminate leak and recharge. NOTE: Disconnect compressor at connector on right rocker cover during recharging. Install new thermal fuse.
2. Thermal Fuse Was Blown During Previous Charging - Check to assure adequate refrigerant charge and install new thermal fuse.
3. Defective Expansion Valve (failed closed) - Replace expansion valve, recharge and install new thermal fuse.
4. Defective Superheat Switch - Before removing switch, check to assure a good electrical connection between switch case and compressor head. If ok, remove switch and check operation as follows: At temperatures below 100°F the switch should be open (open circuit between terminal and case). Switch should close with sensing tube held in match flame 15-20 seconds. If switch does not open and close as described, replace switch.
5. New thermal fuse blows immediately after installation is probably caused by short in wiring to switch. Possible causes of short are as follows:
   A. Pinched, broken or bare wires.
   B. Boot off of connector at switch.
   C. Connector on thermal limiter reversed.
   D. Connector shorted to switch body.
   E. Refrigerant pipes cutting through boot at switch.
   F. Connector off center on switch pin.
6. P.O.A. Defective (stuck open) - This condition can be diagnosed by running the engine at fast idle with the blower disconnected. Evaporator pressure pulls down considerably under the normal 29.5 P.S.I.

7. Use of the A.T.C. Tester—J-23678

The A.T.C. Tester, J-23678, is designed for on-car diagnosis of control problems utilizing car electrical and vacuum supplies. The Tester will not only locate the problem area but will also isolate the individual malfunctioning component.

How The Tester Functions

The Tester is inserted into the control system electrical and vacuum circuits at the programmer connections. The Tester is made up of the following four basic sections:

1. Manual Drive Control - A variable rheostat which replaces the sensor string when the "Automatic - Manual" rocker switch is in the "Manual" position. The rheostat can be varied to cause programmer movement, to analyze programmer operation, to adjust the feedback potentiometer, or to distinguish a sensor string defect from a programmer defect.
2. Voltmeter - Used to check programmer and blower voltages at connector terminals. A "probe and clip" position is also included to allow voltage readings elsewhere in the system.
3. Temperature Dial Calibrator - The temperature

dial setting (resistance) is checked by comparison to a master resistor in the Tester. Allows dial adjustment.

4. Vacuum Gage - Used to check vacuum anywhere in the system.

ALWAYS START DIAGNOSIS WITH BRIEF FUNCTIONAL TEST OF SYSTEM. Refer to section page 1-3 for test procedure.

Tester Procedure

a. Programmer Functional Test

1. Connect tester electrical harness to programmer and car harness to tester.
2. Operate engine at approx. 1000 RPM.
3. Set control head lever at Auto.
4. Turn temp. dial calibration switch off.
5. Place manual-automatic switch in manual position.

(NOTE: This substitutes variable resistor for sensor string at all control head settings.)

6. Place the manual control at max. heat and then rotate slowly counter-clockwise. Vacuum motor mechanism which can be seen through the slot in the programmer cover should start moving at 180 OHMS. Rotating the knob to max. cold should move the programmer to its full A/C position. Check air-mix door for full travel, and no obstructions. If the programmer operates in this manner, the components govering programmer movement -- amplifier, transducer and vacuum motor -- are ok. Proceed to sensor string test.
7. If the programmer moves but the movement does not start at 180 OHMS, adjust feedback pot per procedure in Note 48.
8. If the programmer does not move, check as follows for supply voltage and supply vacuum:

a. Place voltmeter switch in 2 position. Battery voltage should appear on meter. No voltage indicates lack of ground on term 1 or battery supply to term 2 of programmer.

b. Plug tester's dummy vacuum plug on programmer valve. Connect dummy hose to vacuum supply (Port 2 hose in car vacuum harness). Make sure vacuum is present (11 in. hg. or more). Programmer now has vacuum supply with no car vacuum system components connected. If programmer functions using manual control, troubleshoot car vacuum system. If programmer does not function, defects is in programmer. See Part E.

b. Sensor String Test (Do Programmer Functional Test First)

1. Set control lever at auto and temperature dial at 75.
2. Place temp. dial calibration switch at off.
3. Place manual-automatic switch at automatic position.
4. Observe position of vacuum motor mechanism through slot in programmer cover.
5. Switch to manual and adjust manual control for same mechanism position.
6. When manual control is properly adjusted, moving manual-automatic switch back and forth will not move vacuum motor.
7. Read manual control. This indicates the resistance of the sensors and the temperature dial combined and should be 100 to 150 OHMS at 70 to 75 room temp.
8. If reading is not 100 to 150 OHMS, perform the temperature dial calibration test to check out the temp. dial. If temp. dial checks ok, the in-car or ambient sensor or connecting wiring is defective.

c. Temperature Dial Calibration

1. Place control lever at Vent position.
2. Place manual-automatic switch in manual position.
3. Place calibration switch in cal. position.
4. Read Voltmeter.
5. Press pushbutton and adjust temp. dial on control head to get same voltmeter reading as above.
6. Temp. dial should read as indicated on tester panel near pushbutton. If it does not, slip temp. dial clutch to correct. (NOTE: If same voltmeter reading cannot be obtained, the temp. dial is defective.)

d. Blower Circuit Tests

1. Place calibration switch in off position.
2. Place manual-automatic switch in manual position.
3. Set control lever at Lo. using voltmeter knob, there should be battery voltage at 7 and approx. half battery voltage at 6. If there is no voltage at 7, there is a defect in the Lo relay circuit. If there is voltage at 7 but no voltage at 6, the programmer is defective.
4. Set control lever at auto. there should be battery voltage at 8 and the voltage at 6 should stairstep down and then back up as the manual control is rotated from max. heat to max. cold. If full battery voltage is not obtained at 8, there is a defect in the auto relay circuit. If the voltage at 6 does not change as described, the programmer is defective. (NOTE: A good connection between 6 and the blower motor is assumed, if the blower wire is disconnected, only battery voltage will appear at 6.)

e. Programmer Vacuum Circuit

(NOTE: Diagnosing defects in programmer. The following tests should be performed to determine a defective internal part. Tests should be made in the lettered sequence.)

Remove electrical connector from programmer. If programmer moves to max. heat position, skip to Part f, otherwise, perform following test:

1. Remove programmer cover, install dummy vacuum plug with vacuum gauge teed-in to port 2 of car harness plug.
2. If vacuum drops below supply vacuum found in programmer functional test, use long-nose pliers to pinch the two black hoses leading from side of rotary valve. If vacuum reading improves, check programmer hoses for leaks, then go to Part f.
3. If reading does not improve, leak is in rotary valve.

f. Vacuum Motor And checking Relay

1. Disconnect electrical connector from programmer. Programmer should go to full heat.

2. Disconnect vacuum dummy plug or car vacuum harness from programmer. Vacuum checking relay should hold vacuum motor in full heat. If mechanism moves, vacuum motor or checking relay is leaking. Apply raw vacuum to vacuum motor then pinch hose at motor to see if leak is in motor.

g. Amplifier And Transducer

1. Connect tester harness to system. Place manual automatic switch in manual and temp. dial calibration switch in off position.

2. Place voltmeter switch in probe and clip position connect clip to transducer terminal with grey wire.

CAUTION: Do not short transducer terminals together or amplifier will be damaged.

Push probe into programmer connector body making contact with terminal 2 (yellow wire).

3. Rotating the manual control from max. heat to max. cold. The voltage reading should change 5 volts or more for a good amplifier. If amplifier checks bad, check position of mylar insulator on side of amplifier.

h. Transducer Test

1. Connect tester and leads same as in amplifier test (Part g).

2. 11 in. hg. or more vacuum should be present on small transducer supply hose.

3. To check output regulated vacuum, connect vacuum gauge to white striped hose from transducer at vacuum checking relay. Use large tee to make connection: seal extra port with thumb.

4. Rotate manual control to get 0 volts on voltmeter. Turning manual control to max. cold should make vacuum drop to 0 in. hg. Reconnect hoses.

i. Feedback Potentiometer Adjustment

1. Using screwdriver, slip feedback pot shaft counter-clockwise to stop (gear does move). Programmer should move to full heat.

2. Place manual-automatic. Switch in manual position. Rotate manual control to max. heat.

3. Move manual control to 180. Do not over-travel.

4. Slip feedback pot shaft slowly clockwise looking for signs of vacuum motor mechanism movement.

5. Check adjustment with manual control. Travel should start when 180 is reached as knob is turned counter-clockwise from max. heat.

6. If feedback pot cannot be adjusted, replace amplifier assembly.

j. Blower Switch Bench Test. (Using J-23713 Bench Test Harness)

The ATC Programmer Test Harness, J-23713, is a substitute blower motor resistor that is used with ATC Tester, J-23678, a vacuum supply and a 12-volt source to bench-test the programmer, Fig. 1-5.

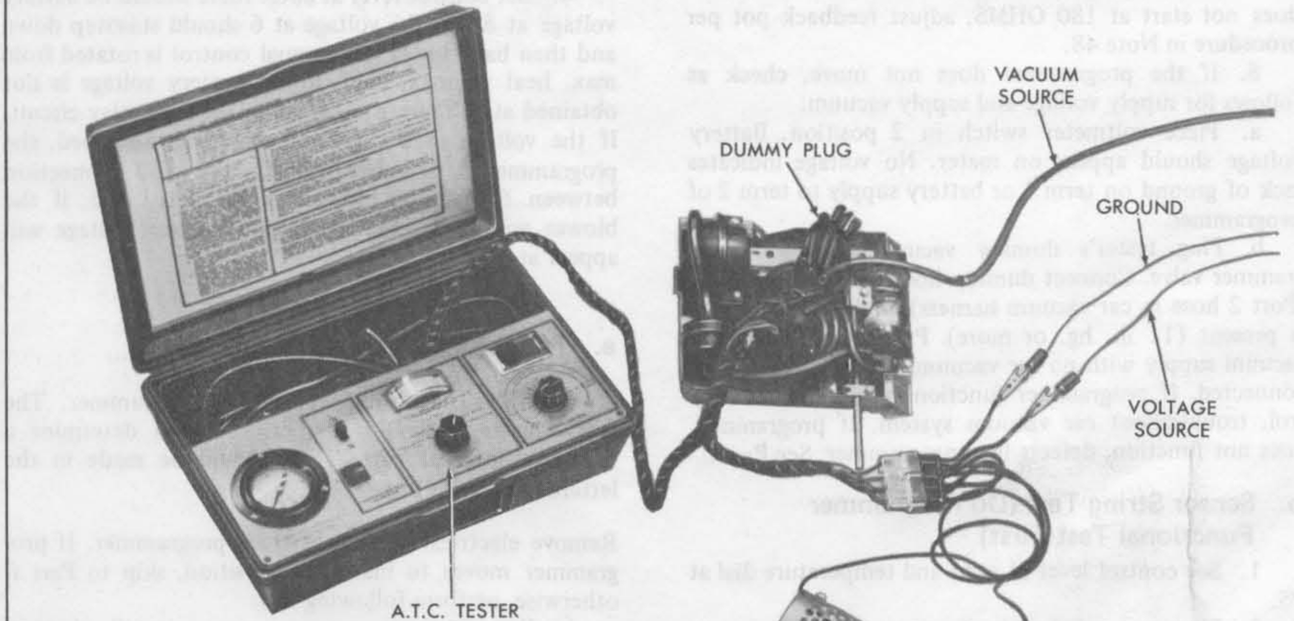


Fig. 1-5 Bench Test Harness

1. With ATC Programmer on bench, plug harness of ATC Tester, J-23678, into programmer electrical connection.

2. Plug Harness (substitute blower resistor), J-23713, into female plug of harness on Tester, J-23678.

3. Connect positive and negative leads of J-23713 Harness to a voltage source.

4. Connect dummy vacuum plug provided with J-23678 into vacuum source.

5. Place voltmeter knob of J-23678 at 6 and place manual-automatic switch in manual position.

6. Rotate manual control knob back and forth (from max. cold to max. A/C). Voltage should drop, then increase, in steps. Voltage variation will be less than when performed on car.

k. Programmer Moves But Vacuum Operated Door(s) Malfunction

If one of the doors does not operate, malfunction could be caused by plugged or pinched harness or plugged valve on programmer. To check programmer valve, cut off sealed hose on dummy plug for circuit malfunctioning and connect the vacuum gauge to the plug. Plug the dummy plug on the programmer vacuum valve. Connect dummy hose to vacuum supply hose (Port 2) in car vacuum harness. Monitor vacuum while operating programmer with manual control. When completed, seal dummy plug hose with rivet. Do not use a screw, refer to Fig. 1-54 for proper vacuum valve operation.

l. Temperature Door Check And Adjustment

A mis-adjusted temperature door link may not allow the programmer to travel fully to max. heat or to max. cold and could result in poor heating or poor cooling complaints. To check adjustment, attach tester electrical harness between programmer and car harness. Put manual-automatic switch in manual and control lever in auto. Put voltmeter knob in 6. Rotate manual control from max. heat to max. cold; high blower (Battery Voltage) should be obtained in both extremes. With control lever in high, recirc. operation should be obtained at max. cold (3 min. delay on some cars). With these conditions met, temperature door adjustment is correct. To readjust:

1. Start engine and put control lever in Def.

2. Loosen screw on programmer shaft.

3. Remove electrical connector from programmer. Programmer should go to full heat.

4. Move temperature door to full heat position by pushing door link away from programmer. The blower air will hold door.

5. Tighten screw and re-check as above.

THEORY OF OPERATION FRONT AIR CONDITIONER—ALL SERIES

Air conditioning is standard equipment on the Fleetwood Seventy-Five Sedan and Limousine and optional on all other series cars. The front system is the same for all series, with the following few exceptions:

- Specific refrigerant hoses for the Eldorado and 75 Series
- Specific heater water hoses for the Eldorado and 75 Series
- Specific condenser and receiver for the Eldorado

75 Series cars are equipped with a rear heating and air conditioning temperature control system which operates completely independent of the front system. It is "teed" into the front system at the heater water and refrigerant feed and return lines. This section contains information on the front system; information on the Series 75 rear system and on the standard Heating and Ventilating system in the non-A/C car is contained in the last two sections; see Table of Contents.

The location of most of the air conditioner components is shown in Fig. 1-6 and 1-7. The information on theory of operation that follows will cover the air delivery system, the refrigeration system and the automatic temperature control system.

Air Delivery System

In normal operation, air utilized by the system is drawn into the body air plenum through openings at the base of the windshield and directed to the air inlet which is located inside the plenum on the right side of the body. From the air inlet, the air enters the blower which directs it through the evaporator where it is filtered, dehumidified and cooled to approximately 35°F. It is then "reheated" as required by being passed through and around the heater core. This air is then directed by air doors in the heater assembly to the air conditioner outlets in the instrument panel, to the heater distributor at floor level or to the defroster outlets. Air exhausts from the body by passing through the air exhaust grilles located in the door lock pillars. This provides positive air flow even when windows are closed. The components comprising the air delivery system are listed and described below.

a. Air Inlet

The air inlet which is attached to the rear surface of the blower scroll and located inside the body air intake plenum is composed of a plastic housing, an air door and a vacuum actuator that controls the position of the door. See Fig. 1-6. The door has two positions -- with no vacuum applied to the actuator, the door is in a rearward position, blocking off the recirculating air opening and allowing only outside air to enter the blower. When vacuum is applied to the actuator, the door is moved to a forward position where it blocks most of the outside air and allows approximately 80% of the total air supply to be recirculated from the passenger compartment.

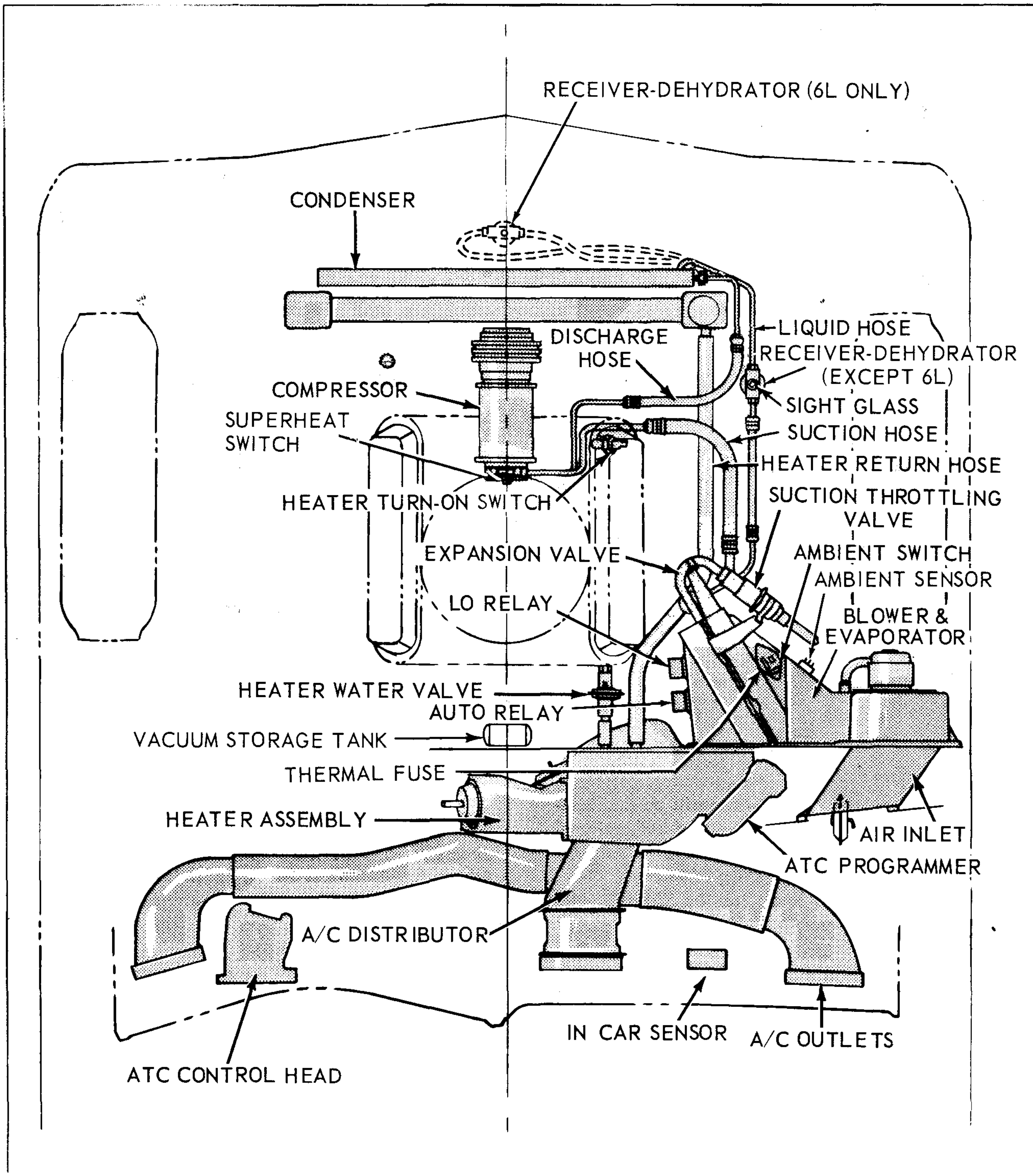


Fig. 1-6 Location of Air Conditioner Components

b. Blower and Evaporator

The blower and evaporator, shown in Fig. 1-8, is located in the engine compartment on the right side of the cowl. This assembly consists of a plastic housing, a squirrel-cage type blower, the evaporator core and two refrigerant control valves.

The evaporator core, which is aluminum and similar in construction to the car radiator, is the actual cooling unit of the system. The blower draws air from the air inlet and forces it through the evaporator core where it is cooled and dehumidified. Condensate is allowed to drain from the housing through a small hole in the bottom. The blower is air cooled – a small portion

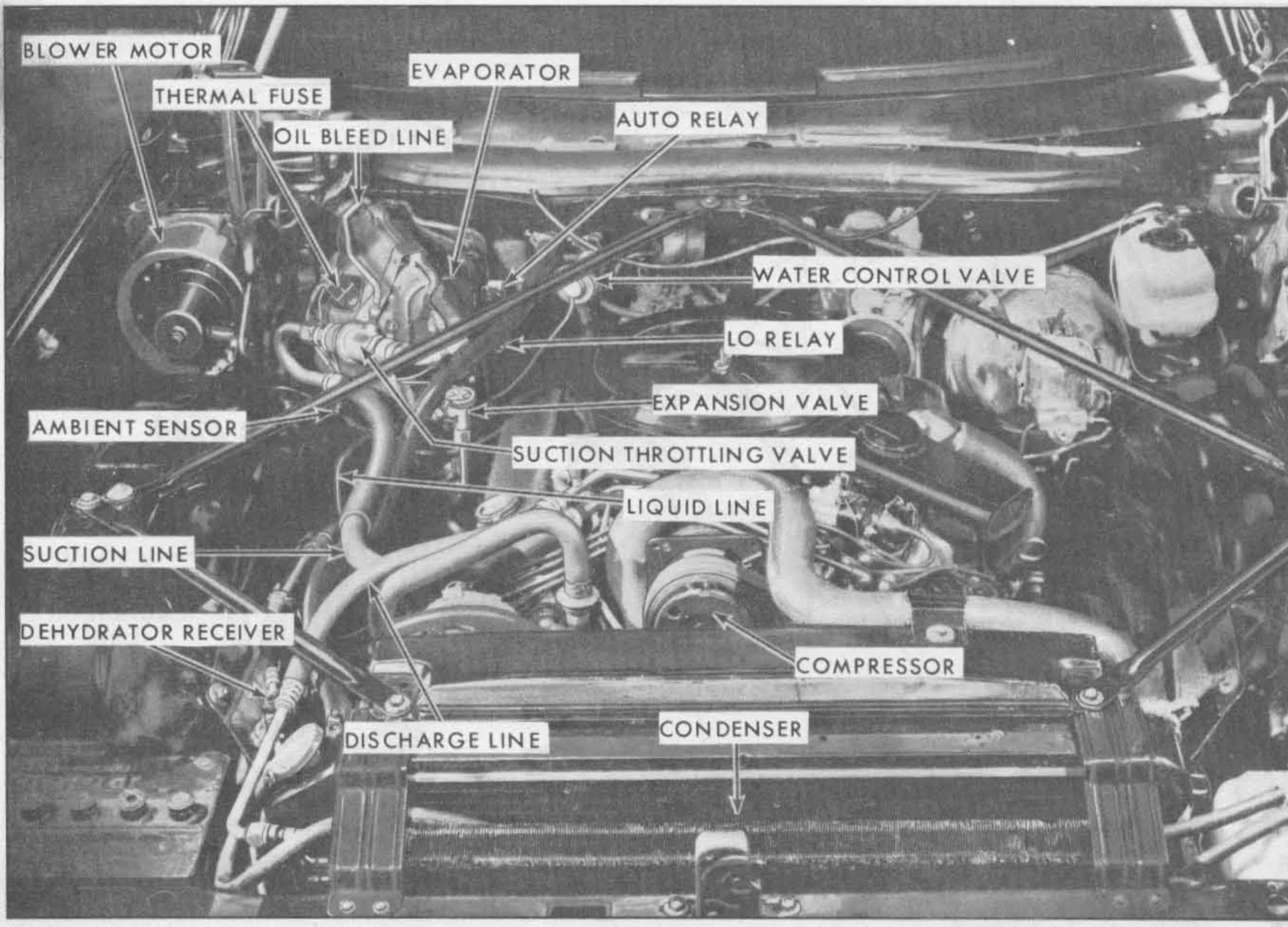


Fig. 1-7 Air Conditioner Underhood Units on Car

of blower output air is recirculated through the motor housing via a rubber tube.

c. Heater

This assembly, shown in Fig. 1-9, is located inside the passenger compartment under the right-hand side of the instrument panel. It consists of a sheet metal and plastic housing, a heater core, an air-mix door which is controlled by the ATC (automatic temperature control) programmer, an upper and a lower mode door, each controlled by a vacuum actuator, and a defroster door which is controlled by a two-stage vacuum actuator.

Cold, dehumidified air from the evaporator enters this assembly through an opening in the dash panel and is reheated, as required, by the heater core. The air-mix door controls the amount of reheat that takes place. In one of its end positions it forces all the air from the evaporator to flow through the hot heater core -- the resulting air stream is very hot. In the extreme opposite position, the door forces all the air to bypass around the heater core so that no reheat takes place and the resulting air stream is very cold. In intermediate positions, some of the air passes through the heater core and some bypasses it, so that the resulting air stream is mixed to the desired temperature.

The air stream is next directed by two mode doors so that it either flows out an opening in the rear surface of the heater case and into the A/C distributor or it continues to flow to the left toward the heater distributor. The two mode doors operate in unison most of the time, causing air to be discharged either from A/C outlets or from the heater distributor; however, when the control head lever is set at "Bi-Level", the upper mode door is not actuated and allows part of the air stream to continue on to the heater distributor while the lower mode door is actuated and positions itself to cause the remainder of the air stream to enter the A/C distributor and be delivered from the A/C outlets. This type of air delivery is referred to as bi-level air delivery.

The defroster door located at the left-hand end of the heater is operated by a two-stage vacuum actuator and has three positions. With vacuum applied to the side port of the actuator, the door is pulled down slightly so that it intercepts only a small amount of air to be diverted to the defroster outlet. When vacuum is applied to both the side and center ports, the door is pulled full down and intercepts most of the air that would normally go to the heater distributor.

d. Air Conditioner Distributor

The A/C distributor is a large plastic duct attached to the rear surface of the heater. It receives air from the heater and distributes it to the left-hand and right-hand A/C outlets through flexible air hoses and to the center outlet through a rubber boot. See Fig. 1-10.

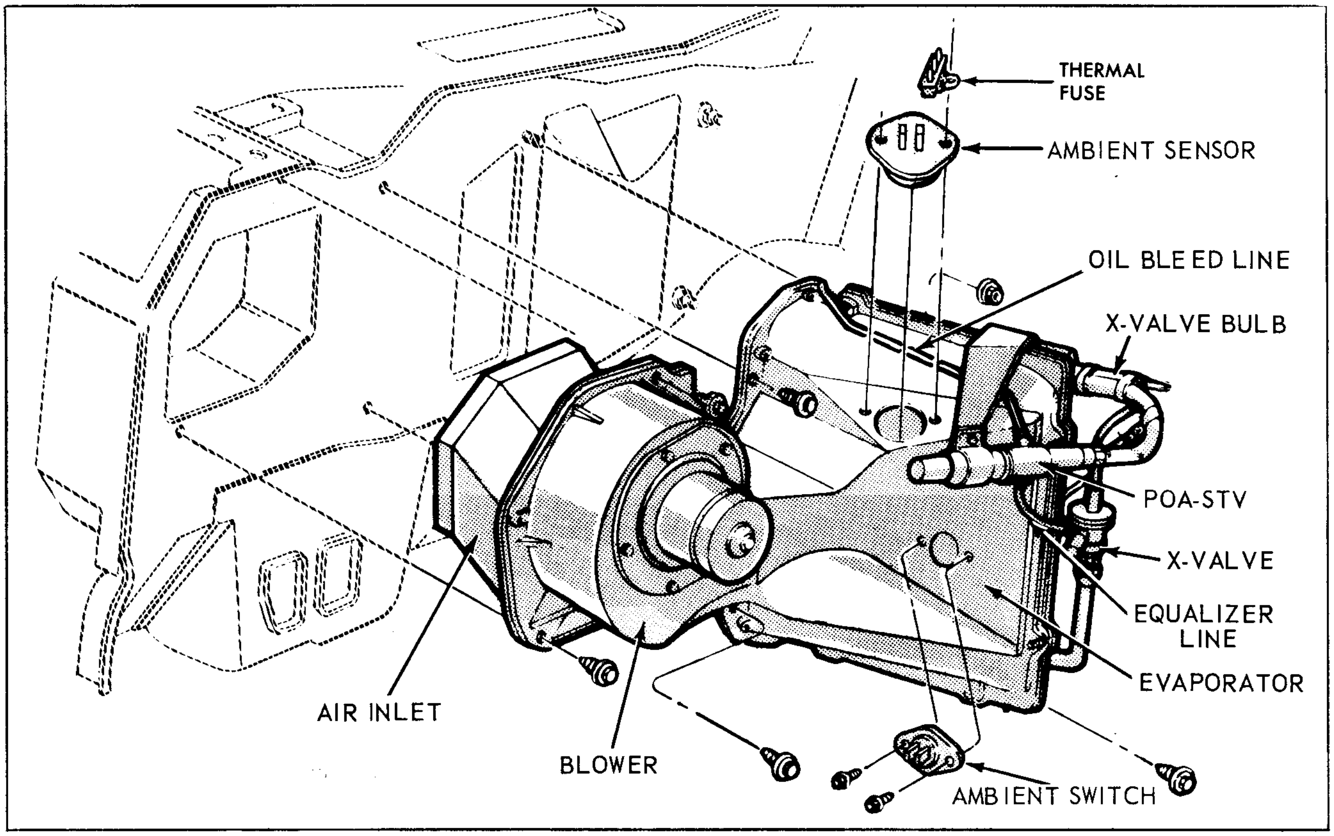


Fig. 1-8 Air Inlet, Blower and Evaporator

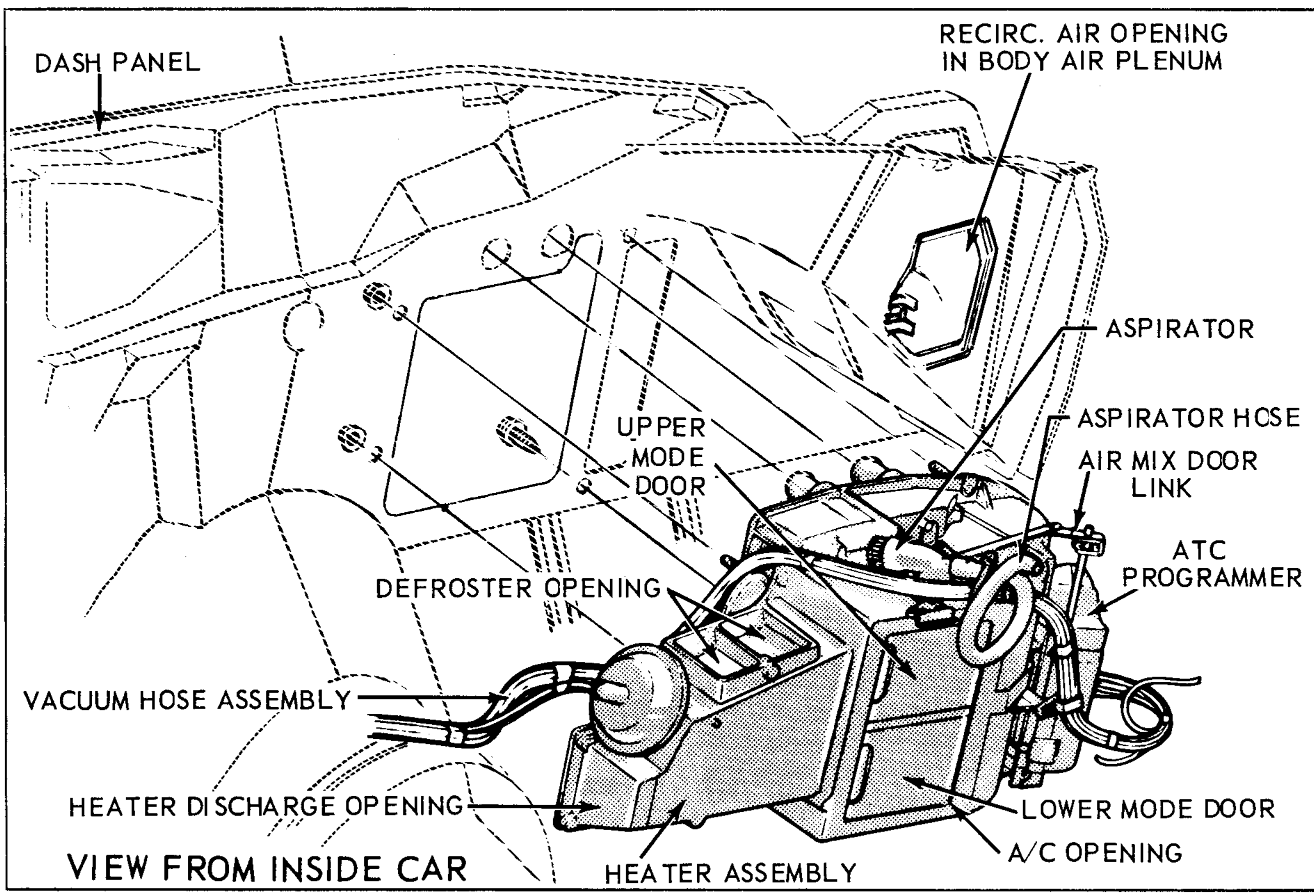


Fig. 1-9 Heater Assembly

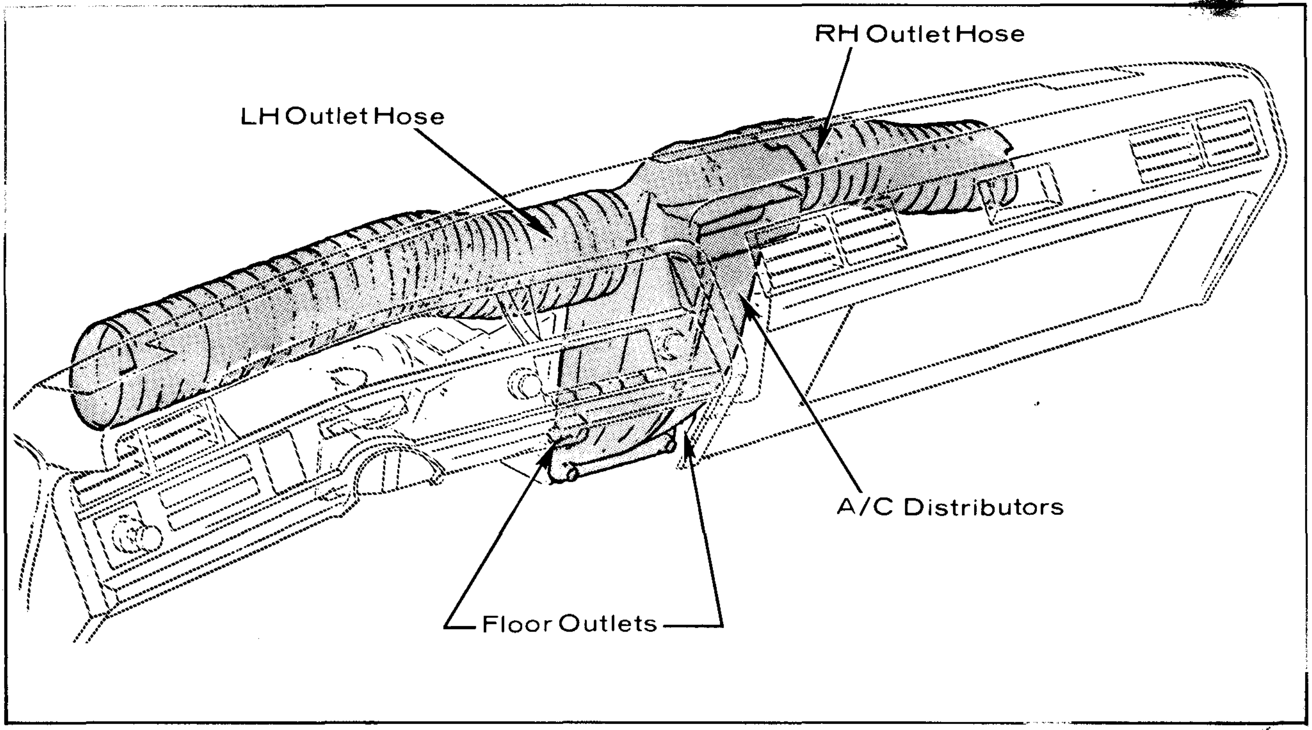


Fig. 1-10 A/C Distributor and Ducts

e. Air Conditioner Outlets

Three dual outlets are located in the instrument panel, one at the left side of the cluster and two in the insert area of the panel top cover. See Fig. 1-11. Each outlet provides two air streams whose direction can be controlled independently by the knobs on the outlet.

A moderate flow of cool air to the floor is provided by two small plastic outlets located on the sides of the A/C distributor. These outlets can be rotated to obtain a more indirect flow of air to the floor area, if desired.

f. Heater Outlet

The heater outlet is attached to the bottom surface of the heater case at centerline of car. It distributes air to the left-hand and right-hand sides of the front floor and also directs two heavy streams of air under the front seat to heat the rear compartment.

g. Defroster Nozzle

A unitized defroster nozzle, shown in Fig. 1-12, delivers defrosting air to both sides of the windshield. It is attached to the top of the heater case near centerline

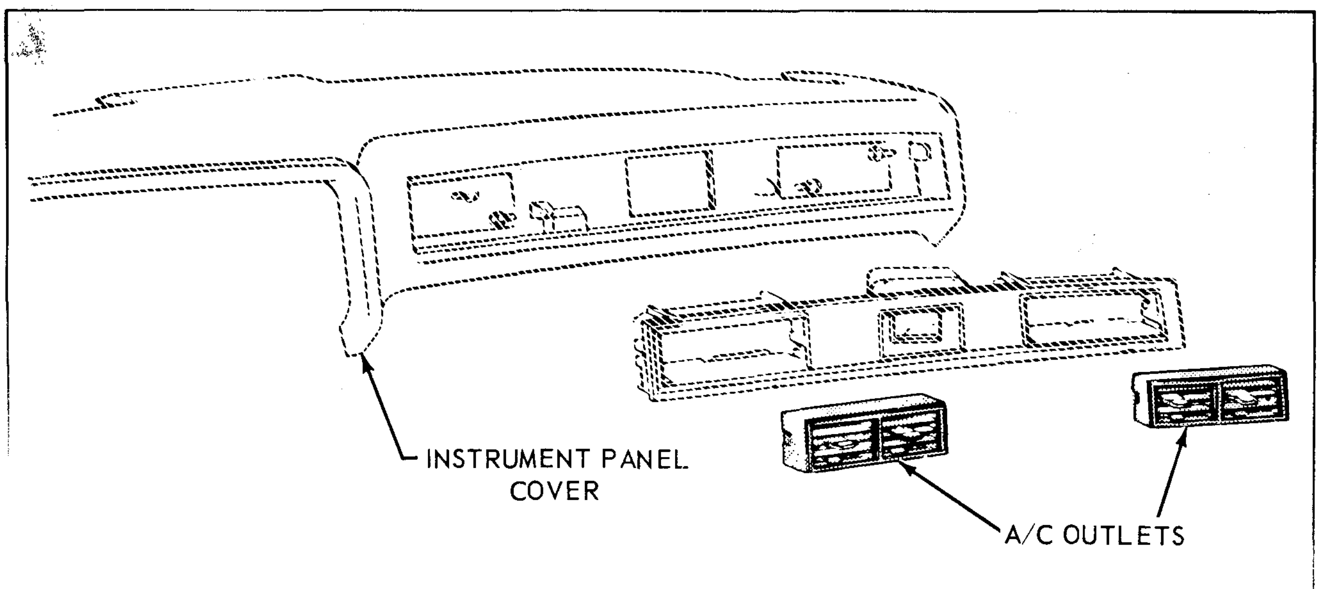


Fig. 1-11 Air Conditioner Outlets

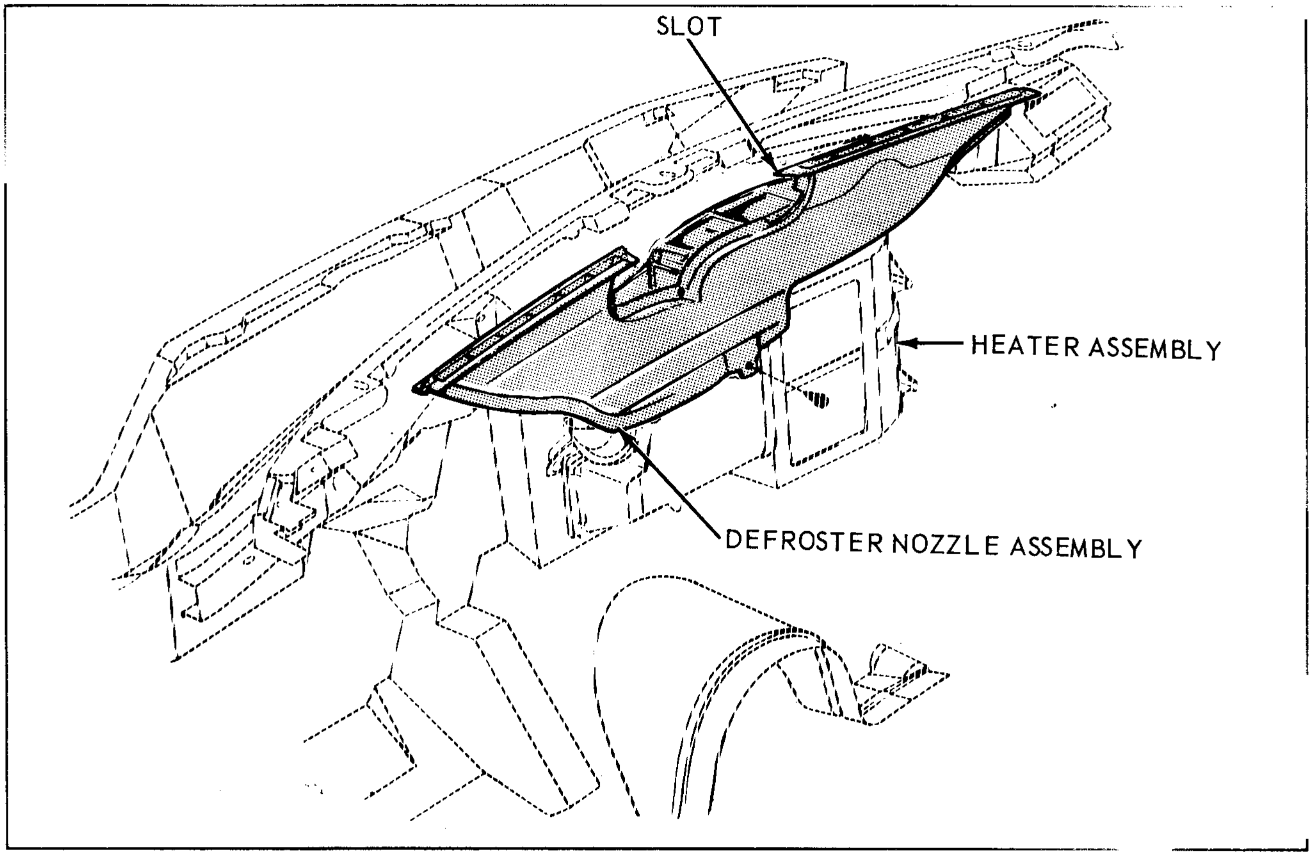


Fig. 1-12 Defroster Nozzle

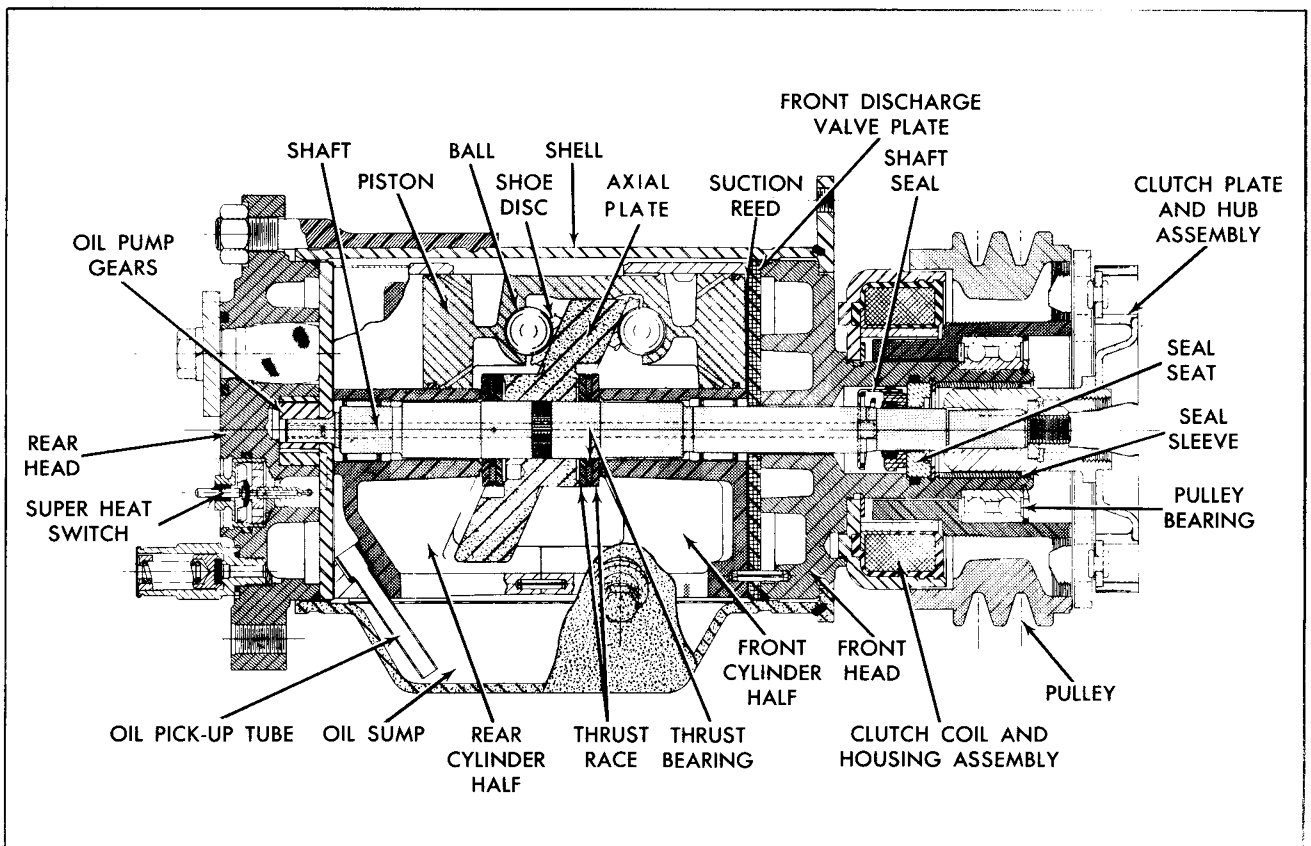


Fig. 1-13 Compressor Cross Section

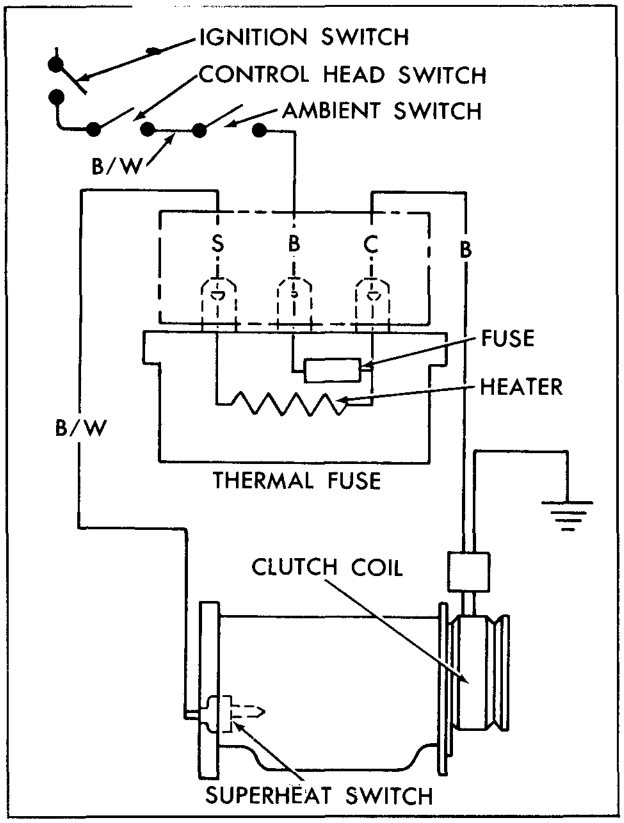


Fig. 1-14 Low Refrigerant Flow System Electrical Circuit

with one screw and is indexed to the lower windshield frame by twist tabs.

h. Air Flow Diagrams

Air flow through the system in various typical situations is shown in Fig. 1-32 through 1-38.

Refrigeration System

The sole function of the refrigeration system is to maintain the evaporator core at approximately 32° when refrigeration is required. Six major components, interconnected by rubber hose and metal tubing, accomplish this - the compressor, the condenser, the receiver-dehydrator, the expansion valve, the evaporator core, and the suction throttling valve. Location of these parts is shown in Fig. 1-6 and Fig. 1-7. A brief description of each component and an explanation of the refrigeration circuit follow.

a. Compressor

The compressor is located on top of the engine near centerline and is driven by two belts from the crankshaft pulley. Its function is to pump refrigerant around the refrigeration circuit and to provide pressure and temperature levels at which heat exchange can take place. It utilizes three double-acting pistons positioned axially around the compressor shaft, each of which operate in a front and a rear cylinder assembly. The pistons are actuated by a axial plate that is pressed on the compressor shaft, Fig. 1-13. The cylinders have bore diameter of 1-1/2 inches and a stroke of 1-3/16 inches, providing a total piston displacement of 12.6 cubic inches. Suction and discharge valve plates are located at the forward end of the front cylinder block and at the rear of the rear cylinder block.

A magnetic clutch is used to drive the compressor shaft. When voltage is applied to the clutch coil, the clutch plate and hub assembly, which is solidly coupled to the compressor shaft, is drawn by magnetic force rearward toward the pulley which rotates freely on the front head casting. The magnetic force locks the clutch plate and pulley together as one unit. The compressor shaft then turns with the pulley. When voltage is removed from the clutch coil, springs in the clutch plate and hub assembly move the clutch plate away from the pulley and the clutch plate and compressor shaft cease to rotate.

b. Low Refrigerant Flow Detection System

A thermal fuse and superheat switch, designed to protect the air conditioning compressor against damage when the refrigerant charge is partially or totally lost or other malfunctions causing low refrigerant flow to the compressor is incorporated on all cars. The thermal fuse is mounted on the top of the evaporator case near the ambient sensor (Fig. 1-6), and the superheat switch is located in the rear head of the compressor, (Fig. 1-14). The fuse and switch are connected in series by an electrical lead.

During normal A/C system operation, current flows through the control head switch, ambient switch and thermal fuse to the clutch coil to actuate the compressor clutch. If a partial or total loss of refrigerant flow occurs in the system, the contacts in the superheat switch close, as the switch senses low system pressure and high suction gas temperature. When the contacts close, current flows to energize a resistor-type heater in the thermal fuse.

The resultant heat melts the fuse link and the circuit to the compressor clutch coil opens. Compressor operation ceases and damage due to loss of refrigerant charge or low flow is prevented.

Before thermal fuse replacement, the cause of the refrigerant loss must be corrected and the system charged.

The thermal fuse is a temperature-sensitive link between the ambient switch and the clutch coil connection.

The fuse has a time delay feature that prevents it from blowing due to momentary switch contact closings during certain transient conditions.

The superheat switch is sealed in the rear head by means of an O-ring between switch housing and head. A retainer ring holds the switch in place and electrically grounds the switch housing to the compressor.

The switch retainer ring must be installed with the high point of the curved sides adjacent to the switch housing. The flat side of the retainer ring provides a positive seat in the retainer ring groove and the tips of the ring give a more positive electrical continuity, Fig. 1-15.

c. Condenser

The condenser is an aluminum, tube-and-fin heat transfer unit located directly forward of the radiator.

The function of the condenser is to transfer heat from the refrigerant flowing through its tubes to the airstream drawn through it by the engine fan.

d. Receiver-Dehydrator

The receiver-dehydrator is a cylindrical, aluminum tank located on the wheel house brace on all models except the Eldorado which is on the hood lock strut. It serves as a refrigerant reservoir. It has a pick-up tube which extends to the bottom of the tank; the refrigerant sight glass, provided as a means of determining whether there is adequate refrigerant in the system, is located at the top of this pick-up tube. A cloth sack filled with moisture-absorbing granules is located inside the cylinder to trap out any traces of moisture that may have got into the system. A screen is located on the bottom end of the pick-up tube.

e. Expansion Valve

The expansion valve is located on the evaporator and blower assembly. See Fig. 1-8. This valve controls the flow of refrigerant to the evaporator core by sensing the temperature of the outlet pipe of the core through a pressurized, temperature-sensitive bulb clamped to the outlet pipe, and by sensing the pressure at the exit of the evaporator through the equalizer line connected to the suction throttling valve. The valve meters the flow of refrigerant in response to these pressure and temperature signals, to keep the core full of liquid refrigerant and assure maximum cooling efficiency. The valve is preset at the factory and is not adjustable. See Fig. 1-16 for cross section of valve.

f. Evaporator

This assembly, shown in Fig. 1-8, is described in part in the air delivery section. One component, the oil bleed line, was not covered in that section. The oil bleed line is a small diameter aluminum tube routed from the inlet tank of the evaporator core to a fitting on the outlet side of the suction throttling valve. This line serves to protect the compressor during periods of low refrigerant charge or flow. When refrigerant charge or flow is low, oil return to the compressor through the outlet pipe of the evaporator is greatly impaired; the oil bleed line acts as a bypass to assure that oil, mixed with liquid refrigerant 12, will be returned to the compressor.

A check valve is incorporated in the oil bleed line at the fitting on the suction throttling valve. This valve starts to open with 10 psi pressure differential across it and is fully open at 20 psi. Below 10 psi the check valve is closed to prevent loss of capacity. This feature prevents refrigerant from bypassing the evaporator core during traffic and low speed conditions when cooling demands are greatest.

g. Suction Throttling Valve

The suction throttling valve is attached to the evaporator outlet pipe. See Fig. 1-8 for location and Fig. 1-17 for a cross-section. The sole function of this valve is to throttle the flow of refrigerant from the evaporator so that a constant pressure of 29.5 psi ± .5 psi is maintained in the core. At this pressure the evaporator tubes and fins are maintained at approximately 32°F. If the pressure in the core were allowed to drop much below 29.5 psi, ice would form in the core and block air flow.

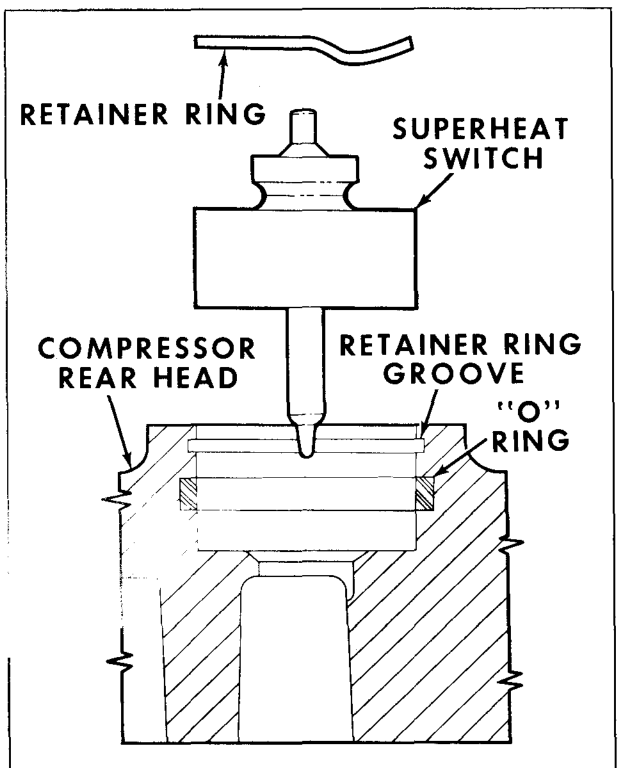


Fig. 1-15 Superheat Switch Retainer

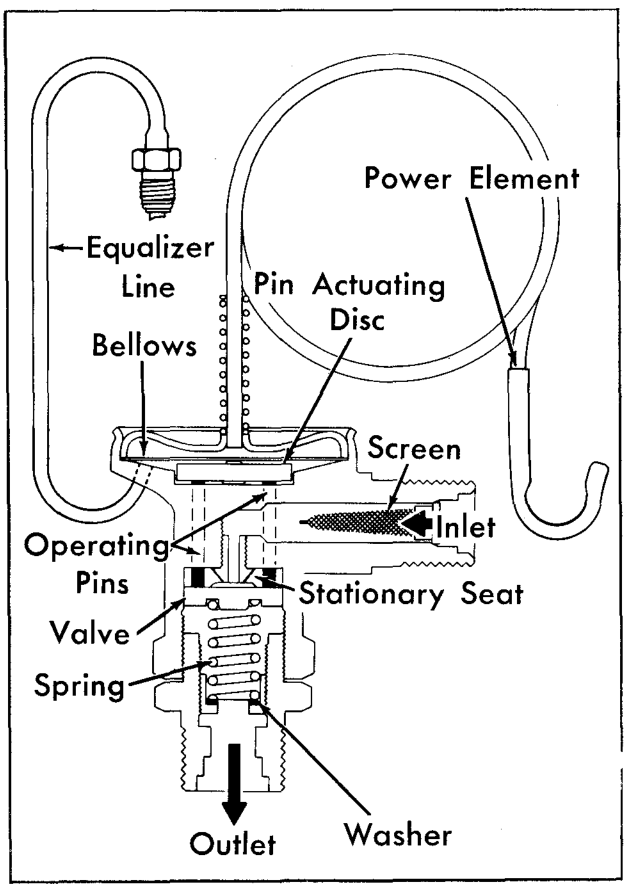


Fig. 1-16 Expansion Valve

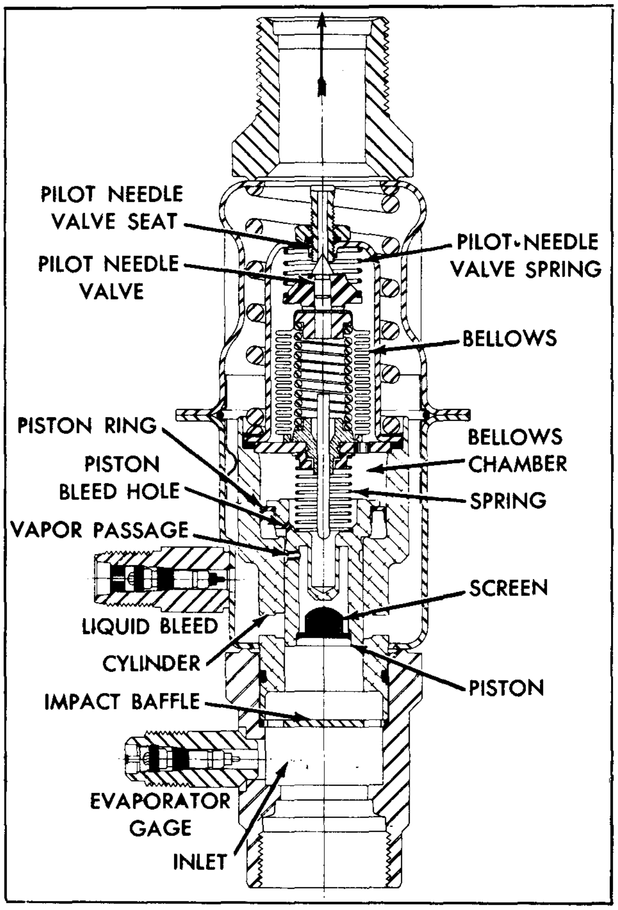


Fig. 1-17 Suction Throttling Valve

The capability of the valve to maintain 29.5 psi is, of course, limited by compressor capacity; at low compressor speed and high evaporator load the evaporator pressure may be greater than 29.5 psi, and the valve will be wide open.

The valve is controlled in operation by opposing forces on the valve piston; evaporator pressure on one side of the piston is opposed by spring pressure and control pressure on the other side.

When evaporator pressure rises above 29.5 psi, this pressure is exerted against the piston and, by means of a small bleed hole in the piston, into the bellows chamber, where it is reduced to control pressure by the bellows-operated pilot needle valve. This evaporator pressure overcomes both the spring pressure and control pressure, causing the piston to open until a balanced position is reached, at which evaporator pressure returns to the setting desired.

When evaporator pressure drops below 29.5 psi, spring pressure overcomes evaporator pressure, causing the piston to close down until the evaporator pressure returns to 29.5 psi.

h. Refrigeration Cycle

Refer to Fig. 1-18 for a generalized schematic of the refrigeration system showing relationship of components. The compressor discharges high temperature, high pressure vapor that contains heat absorbed in the evaporator plus heat imparted to it by the compressor in the compression process. This vapor flows through two parallel tubes in the condenser where it releases heat to the airstream and changes to a medium temperature high pressure liquid. This liquid flows to the receiver-dehydrator; from there it flows through the pickup tube past a sight glass and through the liquid line to the expansion valve on the evaporator assembly. At the flow control orifice in the expansion valve, the medium temperature, high pressure liquid changes to a low temperature, low pressure liquid and vapor mixture. This cold, foamy mixture enters the evaporator core at the bottom end and flows through parallel tubes upward through the core. Heat from the warm air-stream passing through the core is transferred to the refrigerant, vaporizing the liquid. Under high load conditions all the liquid is vaporized in the evaporator and only vapor flows through the suction throttling valve and the suction line to the compressor. The heat-laden vapor is drawn into the compressor and the cycle is repeated.

Temperature Control System

Control Panel Settings

The temperature control system provides automatic regulation of the car interior temperature regardless of outside temperature changes. The control panel, Fig. 1-19, consists of a temperature dial with a range of 65°F to 85°F and a single sliding lever to permit the customer to choose various modes of operation. The "Auto" setting is recommended for most situations since it provides high blower operation for quick cooldowns or warmups and yet modulates down in blower speed when the temperature on the dial has been reached. There are six additional settings which provide customer control for unusual conditions. An explanation of the system operation at various lever settings begins on page 1

Control System Components

Following is a complete list of the components which comprise the temperature control system. The location of the part is given together with a brief description of how the part works. System operation and how the various components interact within the system is explained in a subsequent section.

a. Control Panel

The control panel, Fig. 1-19, is located in the instrument panel cluster to the left of the steering column and consists of a diecast bezel, a diecast base-plate, an acrylic lens and the functional components described below.

The temperature dial is graduated in 5°F increments between 65° and 85° and is color-coded -- red for hot blue for cold and white for moderate temperatures -- to facilitate adjustments. The dial actuates and varies the resistance of a wire-wound rheostat mounted directly mounted above it.

The circuit board electrical switch is mounted on the underside of the baseplate. Attached to and positioned by the control lever are wiper contacts which ride on the circuit board pads to provide the required electrical circuit connections. How these connections are made is illustrated in the electrical circuit diagram on page 1-32.

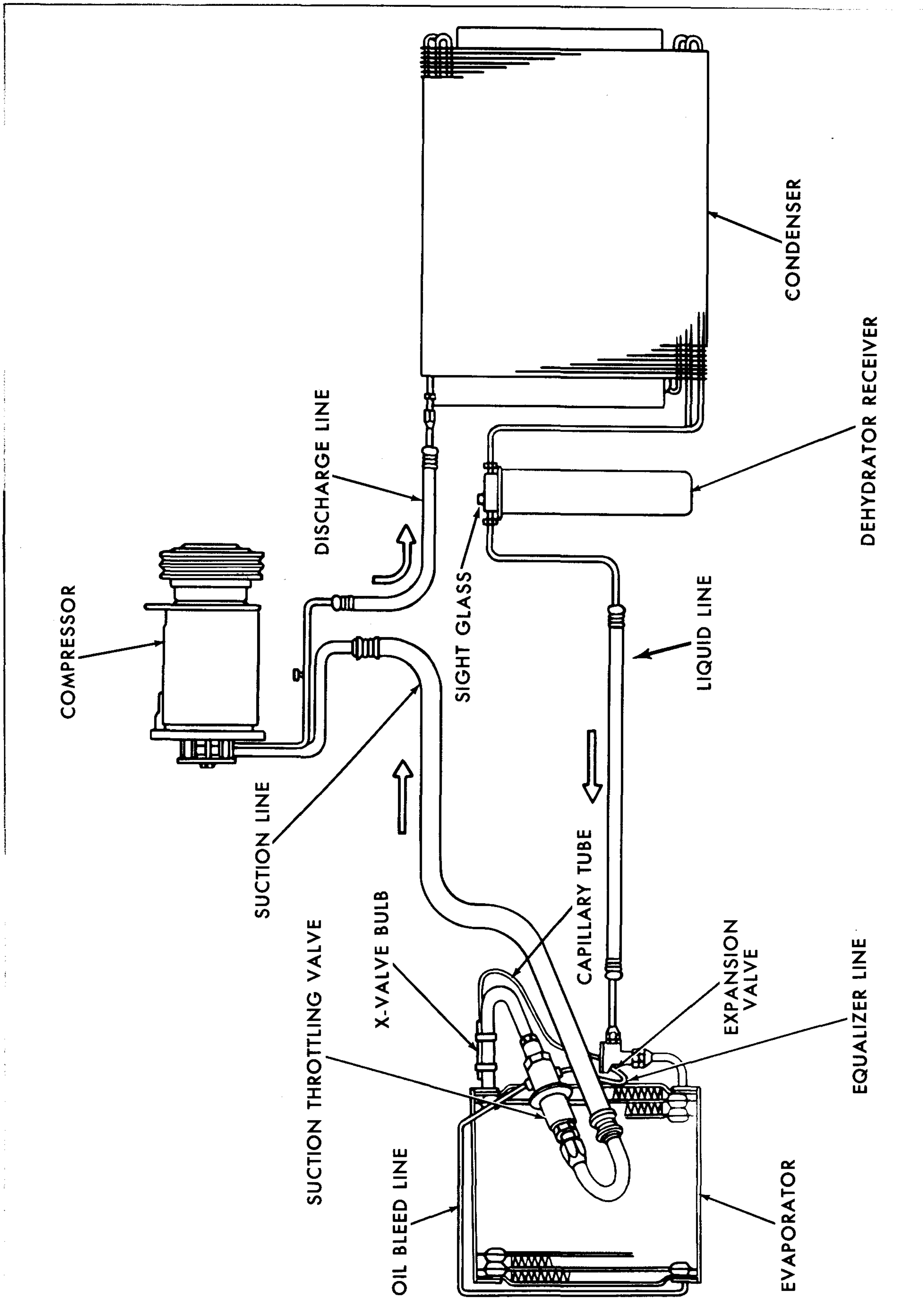


Fig. 1-18 Refrigeration Circuit

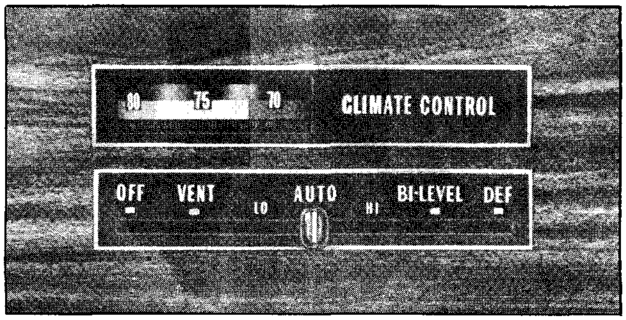


Fig. 1-19 Control Panel Face

Electrical wires from the switch and from the temperature dial rheostat are brought to a single ten-way connector.

The in-car turn-on switch (Fig. 1-20) is a thermostatic switch enclosed in a small plastic cylinder located just forward of the wire-retaining clip on the baseplate. It senses car interior temperature and will close and turn the system on if that temperature is above approximately 75°, even if engine water is cold and the other turn-on switch, located in the engine, is cold. This provides immediate cooling in a hot car that has not been run for some time.

The control vacuum valve, (Fig. 1-20) located at the forward edge of the baseplate, is a nine-port rotary valve which interconnects or vents the vacuum hoses attached to it to perform various vacuum functions required in the system. How the valve performs these functions is illustrated in the vacuum circuit diagram contained in a later section.

The control lens and the temperature dial are illuminated by a single bulb located on the right side of the control.

b. Sensors

Two sensors are used, one sensing outside air temperature and the other the car interior temperature. Both are disc-type thermistors approximately .30" in diameter and .060 thick. (A thermistor is a special resistor whose value changes markedly with temperature change -- it also differs from an ordinary resistor in that its resistance decreases as it gets hotter). The changes in resistance of these units forms the basic input to the control system.

The in-car sensor is located below the perforations on the top surface of the instrument panel cover, Fig. 1-21.

The ambient sensor is mounted on a flat phenolic board that attaches to the inlet case of the evaporator. See Fig. 1-22. Also mounted on this board is the compressor ambient switch; this switch is a bi-metal disc-type, snap-action thermostatic switch that disconnects the compressor below approximately 32°F ambient temperature. Both the sensor and the switch protrude into and sense the temperature of the air stream entering the evaporator core. Fig. 1-51 shows sensor characteristics.

c. Aspirator

To provide accurate sensing of the car interior temperature, a small amount of air is drawn into the in-car sensor housing and passed over the thermistor. See Fig. 1-23. This air movement is accomplished by the use of an aspirator mounted on top of the heater assembly and a rubber hose that connects the in-car sensor housing to the aspirator. The aspirator is a tube-within-a-tube arrangement; air from the heater case is discharged out the main, outer tube -- this air stream causes a suction at the end of the inner tube so that air flows out it also. The aspirator is equipped with a shield to prevent its outlet end from being blocked.

d. Programmer

The programmer, which contains the bulk of the temperature control components, is located in the passenger compartment on the right-hand end of the heater case. See Fig. 1-9 and 1-24. It is secured to the heater with three screws. It consists of a zinc die-cast chassis, a removable plastic cover and the functional components described below.

The amplifier, mounted to the chassis in the upper center area of the programmer, is a three-stage D-C amplifier that accepts a weak electrical signal from the sensors and the temperature dial and provides a strong output signal proportional to input. How the amplifier does this is explained on page 1-33. The amplifier should be serviced only as an assembly. No attempt should be made to repair an amplifier except by an experienced electronics technician with the proper service aids for calibration.

The transducer, located in the upper left corner of the assembly, consists of a vacuum regulating valve and solenoid coil. Output current from the amplifier flows through the solenoid coil and controls the vacuum output of the transducer. This component, in effect, transforms the electrical signal from the amplifier to an inversely proportional vacuum which is fed to the vacuum motor in another area of the programmer. More information on how this unit works is given on page 1-33.

The vacuum checking relay is located in the upper right corner of the programmer. It provides two separate vacuum checking functions. See Fig. 1-25. In the upper part of the relay is a conventional rubber check valve which is opened by engine vacuum applied at port 5, allowing port 3, which supplies vacuum to the rotary vacuum valve on the programmer and the control head, to be evacuated. If engine vacuum drops because of acceleration or steep grades, the check valve closes, maintaining the vacuum level at port 3.

In the lower part of the relay is a spring-loaded diaphragm which blocks or passes regulated vacuum from the transducer which is connected at port 2 to the vacuum motor which is connected to port 1. When engine vacuum at port 5 is high, the diaphragm is pulled upward allowing regulated vacuum to pass to the vacuum motor. When engine vacuum drops, the diaphragm moves downward blocking passage and maintaining vacuum in the vacuum motor.

The vacuum motor, located in the lower right corner, produces all mechanical motion within the programmer. It positions the vacuum motor mechanism which actuates the rotary shaft which drives the air-mix door link. This same mechanism moves the blower circuit board wiper, the vacuum valve operating arm and

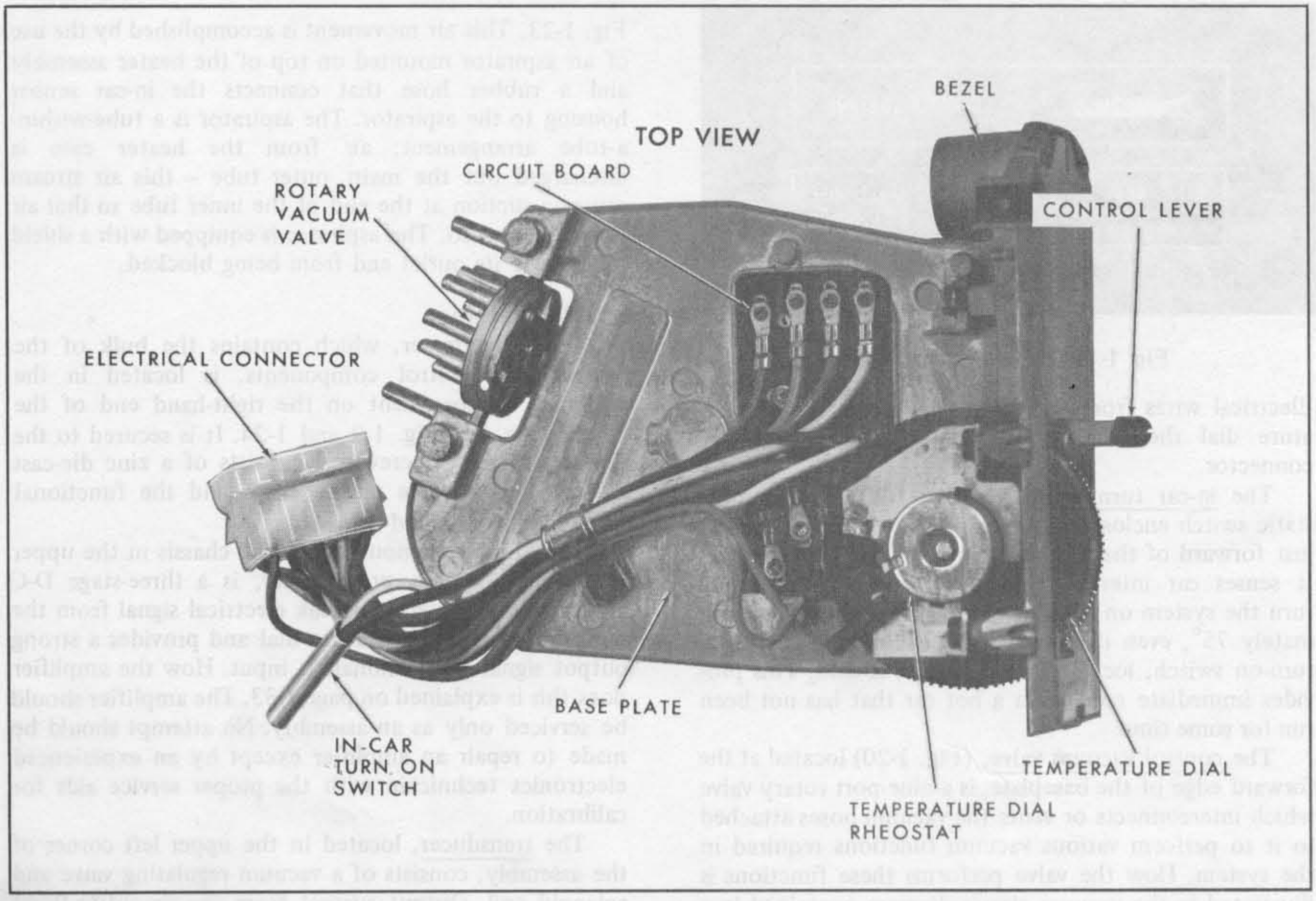


Fig. 1-20 Control Panel

the feedback potentiometer. The vacuum motor mechanism is spring-loaded by a spring at its left-hand end so that with no vacuum it is fully extended out of the vacuum motor. This is the "Max A/C" position. When vacuum is applied to the vacuum motor, the mechanism is pulled into the vacuum motor -- approximately 8" of vacuum is required to pull the mechanism all the way to the "Max Heat" position.

The blower circuit board switch is located in the lower center part of the programmer. Spring-loaded contacts move across the board making the required blower circuit connections. The configuration of this switch is similar to that of the circuit board switch on the control head. Three resistors are attached to the underside of the circuit board and protrude through an opening in the heater case into the heater air stream which provides cooling for them. The function of the switch is to place these resistors into the blower circuit at the required points in the program to control blower speed. A low blower resistor is also attached to the circuit board. Refer to the electrical circuit diagram contained on page 1-58 for a better understanding of this switch.

The vacuum valve, located in the center of the assembly, is a nine-port rotary valve which makes connections between the various ports or vents them, as required, to move air doors, operate the heater water valve, etc. Refer to vacuum circuit on page 1-58 for additional information.

The feedback potentiometer is located just above the vacuum valve. Its function is to snub movement of the vacuum motor so that a small signal from the sensors does not drive the motor all the way, one way or the other. The feedback pot is located, electrically, in the sensor string circuit and operates in opposition to the sensors -- if a sensor drives the vacuum motor toward "Max Heat", for example, when the motor starts to move, it will rotate the potentiometer so that its resistance change tends to offset the resistance change of the sensor. This unit is adjustable -- follow instructions accompanying the ATC Tester carefully when adjusting it.

The sequence of events in the control program as the programmer moves from "Max A/C" to "Max Heat" is given below:

1. Possibility of recirculated air is terminated.
2. Blower speed drops from HI to M_3.
3. Heater water valve opens.
4. Air-mix door starts to move, blending in hot air.
5. Blower speed drops to M_2.
6. Blower speed drops to M_1.
7. Mode of air delivery changes from A/C to heater.
8. Blower speed increases to M_2.
9. Air-mix door reaches "Max Heat" position.
10. Blower speed increases to M_3.
11. Blower speed increased to HI.

The sequence of events is reversed as the programmer moves from "Max Heat" to "Max A/C".

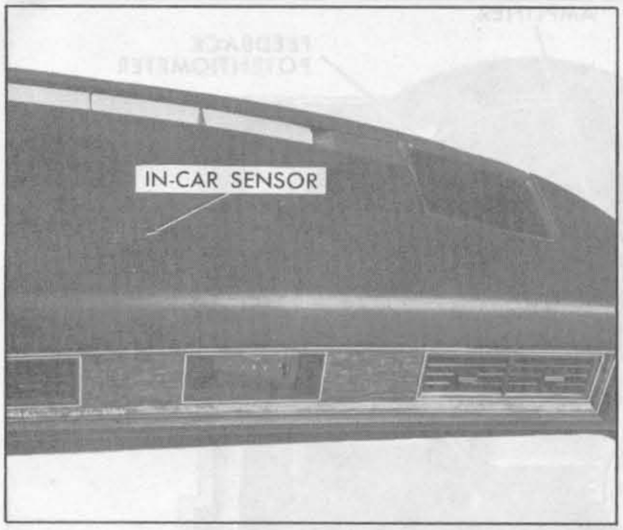


Fig. 1-21 In-Car Sensor

e. Air-Mix Door Link

The air-mix door link consists of a spring steel crank arm which slips down over the top of the output shaft of the programmer and a rod riveted to the crank arm. The other end of the rod attaches to the air-mix door crank arm and is retained to it with a clip. The spring steel crankarm is attached to the output shaft with a set screw which is tightened when the link is adjusted. The programmer positions the air-mix door by this link. See "Systems Adjustments" for adjustment procedure.

f. Blower Relays

Two single-pole, single throw relays are used to supply power to the blower. Both are located on the inboard side of the evaporator case in the engine

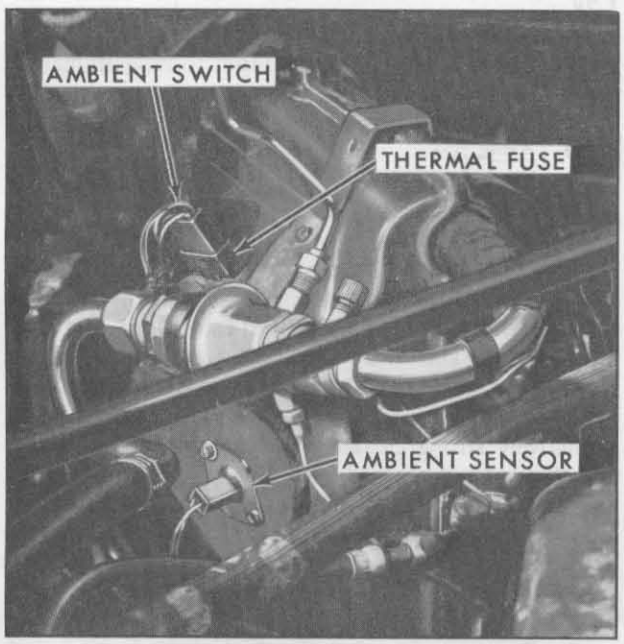


Fig. 1-22 Ambient Sensor and Switch

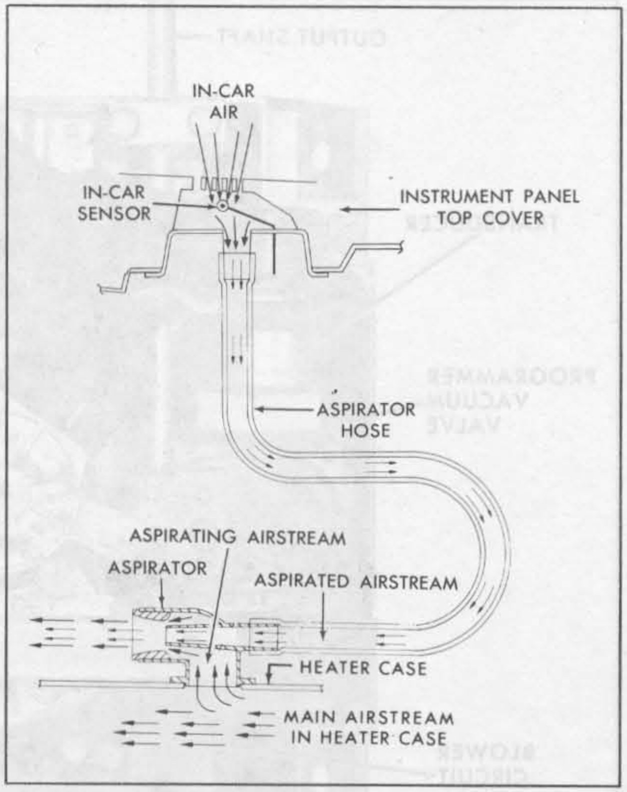


Fig. 1-23 In-Car Sensor Aspirator

compartment. See Fig. 1-26. The "Lo Relay" supplies power in the "Off", "Vent", and "Lo" positions of the control lever; the "Auto Relay" in the remainder of the positions. The two relays are identical and interchangeable.

g. Heater Turn-On Switch

This switch is a bi-metal, snap-action switch located in the front of the right-hand cylinder head, Fig. 1-27. It senses engine water temperature; it is closed above approximately 120°F and is open below that temperature.

h. Heater Water Valve

This valve is located in the engine compartment just to the left of the evaporator assembly. See Fig. 1-26. Its function is to pass or block flow of water to the heater. It is normally open but is closed by vacuum from the programmer vacuum valve when the programmer is positioned at "Max A/C".

i. Vacuum Hose Assembly

This assembly is mounted primarily on the heater inside the passenger compartment with connections to the programmer, the upper and lower mode door actuators and the defroster actuator, all of which are also a part of or mounted to the heater. See Fig. 1-9. A heavy branch of the hose assembly is routed to the control panel vacuum valve. Vacuum supply is obtained from a tee in a large vacuum hose (1/4 inch nominal) that comes from a fitting on the engine and penetrates the dash panel just forward and slightly to the left of the

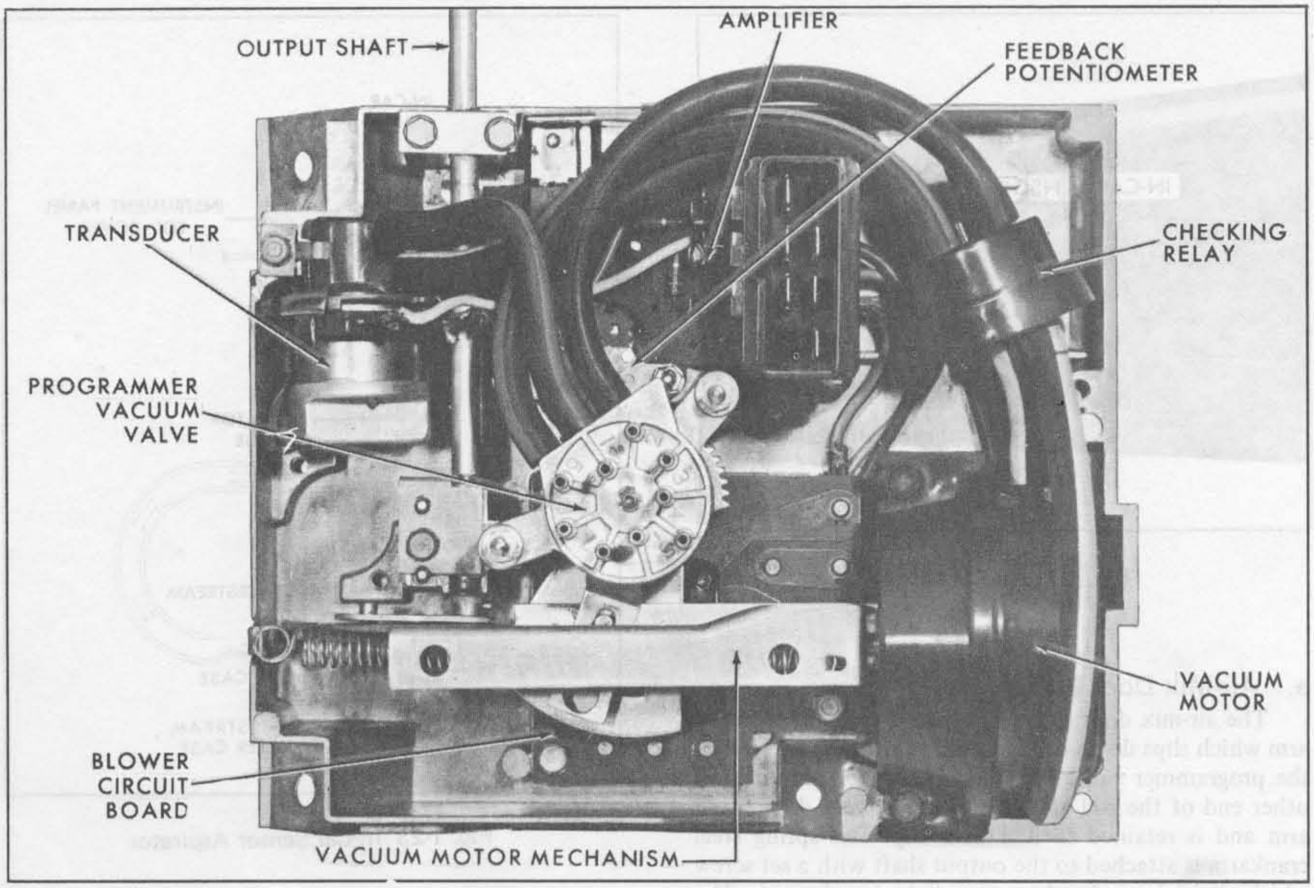


Fig. 1-24 Programmer

lower mode door actuator. The harness has two single hoses at its right-hand end which connect to the recirculating door actuator and to the heater water valve. The hose assembly is made of vinyl tubing with connector blocks at the programmer and control head which are retained with push-on washers. Hose retainers are also used at the two mode door actuators because of their inaccessibility.

A small porous vacuum delay plug is located in the end of the yellow hose that attaches to the outboard nipple of the defroster actuator. This plug provides a restriction to air flow and delays actuation of the defroster bleed function (approximately 45 seconds) after vacuum is supplied through the yellow hose. This delay is necessary to prevent sudden fogging of the windshield that can happen when the car is started under certain conditions. Do not remove this plug.

Another porous vacuum delay plug is located in the end of the orange vacuum hose that attaches to the recirc door actuator. This plug dampens movement of the recirc door to minimize cycling. The two plugs are not interchangeable.

Control System Operation

The automatic temperature control system is made up of three major sections which perform the following operations:

A. Temperature Control
B. Blower Control
C. Auxiliary Electrical and Vacuum Functions

The above sections will be described separately and in detail to aid system understanding and service diagnosis. Partial electrical and vacuum circuits are used to simplify operation explanation. Complete electrical and vacuum circuits are available on pages 1-58 and 1-59.

a. Temperature Control Circuit

This circuit is comprised of the following parts, described in the preceding section and shown in Fig. 1-28.

• Ambient Sensor • In-Car Sensor • Temp Dial	Input to Programmer
• Feedback Pot • Amplifier • Transducer • Vacuum Relay • Vacuum Motor	Programmer

The resistance of the two sensors varies with their temperature. Their resistance, plus that of the temperature dial, form the input (point 1 to point 3) to the programmer. This weak electrical signal, which varies with the temperature of the sensor or with temperature dial movements, is amplified by the amplifier to produce a relatively strong current flow through the transducer coil that varies in accord with input signal changes. The transducer converts this electrical signal to a proportional vacuum signal which is routed through the vacuum relay to the vacuum motor. The vacuum motor performs the following five output functions:

1. Positions the air-mix door
2. Positions the wiper on the blower circuit board switch

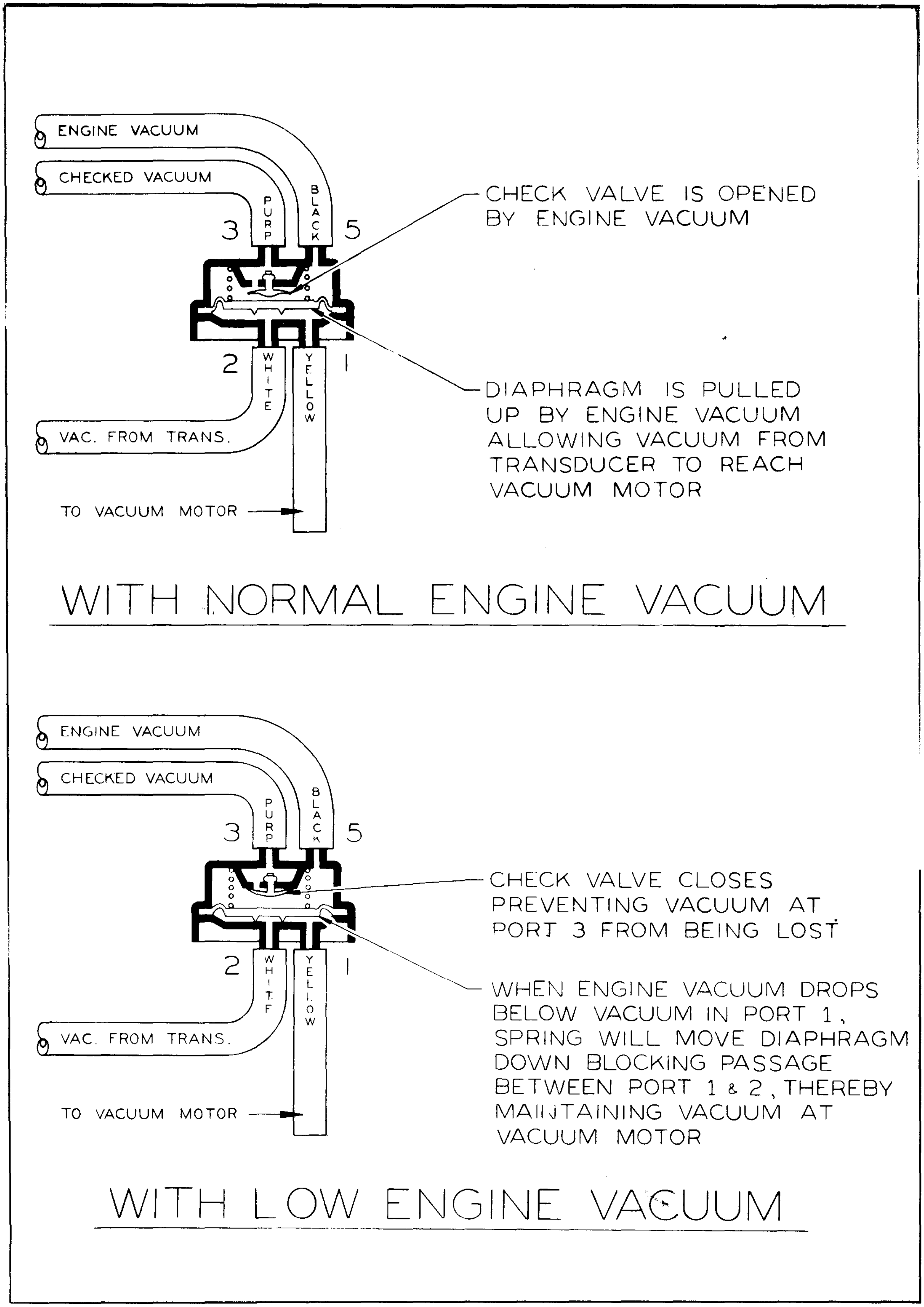


Fig. 1-25 Operation of Vacuum Checking Relay

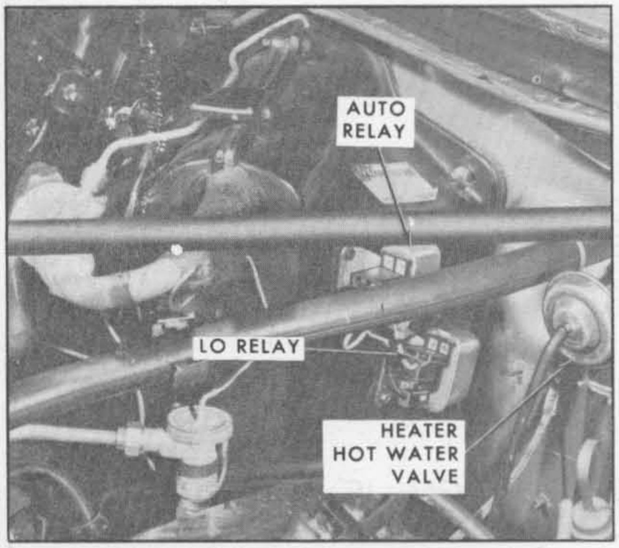


Fig. 1-26 Blower Relays and Heater Water Valve

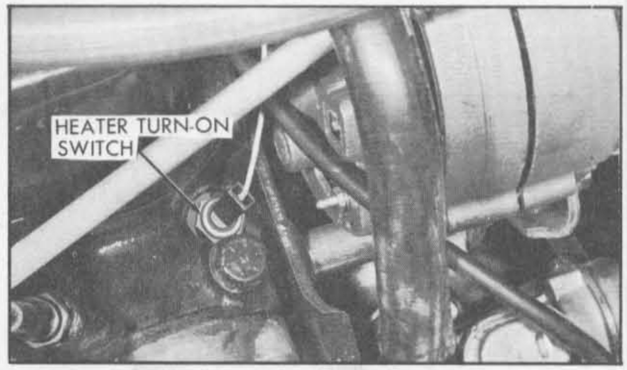


Fig. 1-27 Heater Turn-On Switch

3. Controls mode door operation
4. Controls heater water valve
5. Controls recirc air door

} Through Vacuum Valve

Input-output characteristics of the programmer are shown in Fig. 1-29. Input is resistance in ohms; output consists of the five functions listed above. Several examples are listed below to provide further understanding.

1. Assume the car is stabilized on a sunny 80° day with the in-car sensor being maintained at 75° with a 75° temp dial setting. The resistance of the ambient sensor at 80° is 32 ohms, the in-car sensor resistance at 75° is 68 ohms, and the temp dial resistance at the 75° setting is 36 ohms. These three resistances total 136 ohms. Referring to Fig. 1-29, this resistance will position the programmer to produce M_1 blower speed, an intermediate discharge air temperature (approximately 60°), A/C mode, an open heater water valve and outside air.

2. If the ambient temperature were to increase to 90°, the ambient sensor resistance would decrease to 26 ohms. This change in resistance would cause amplifier

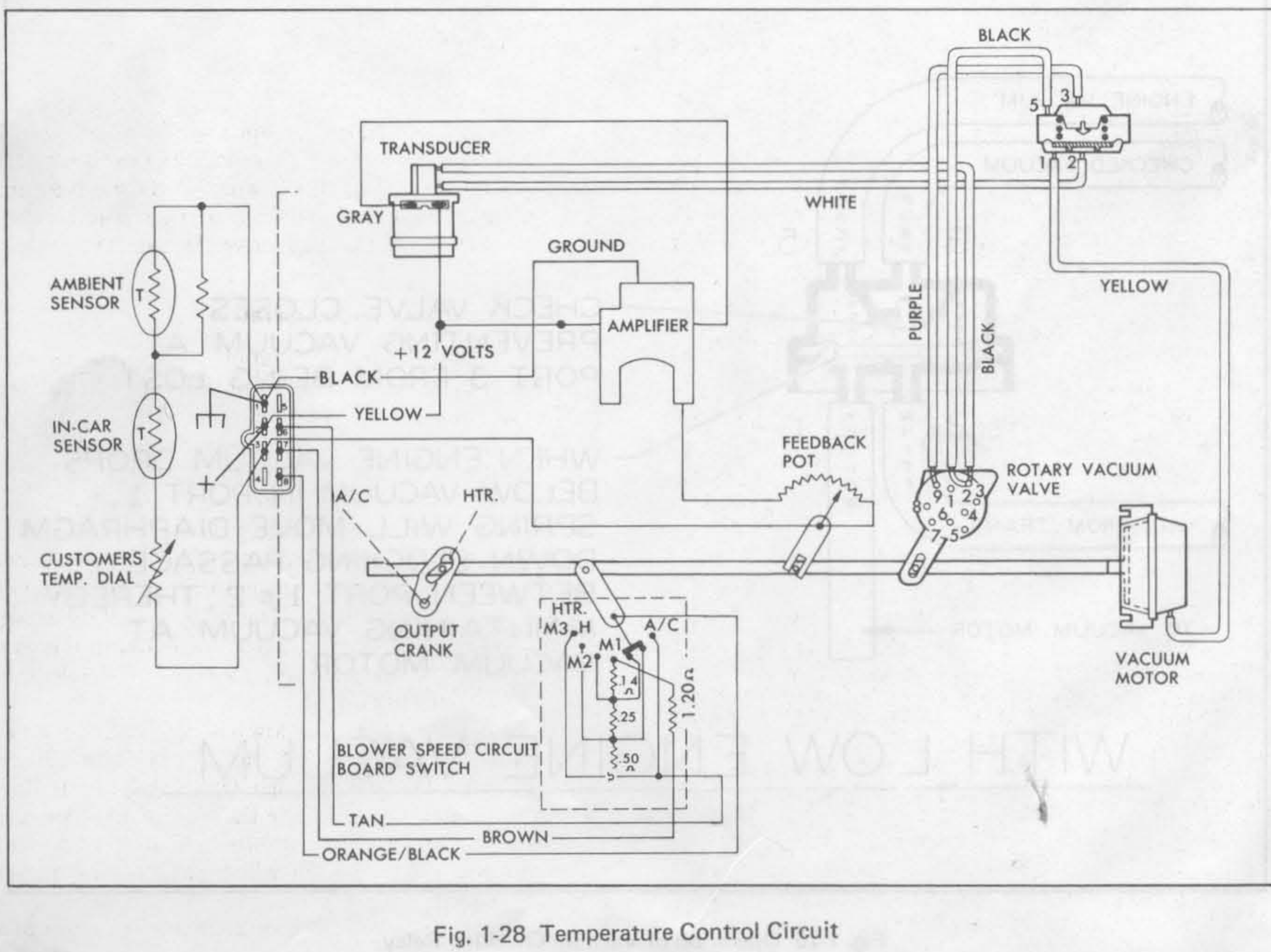


Fig. 1-28 Temperature Control Circuit

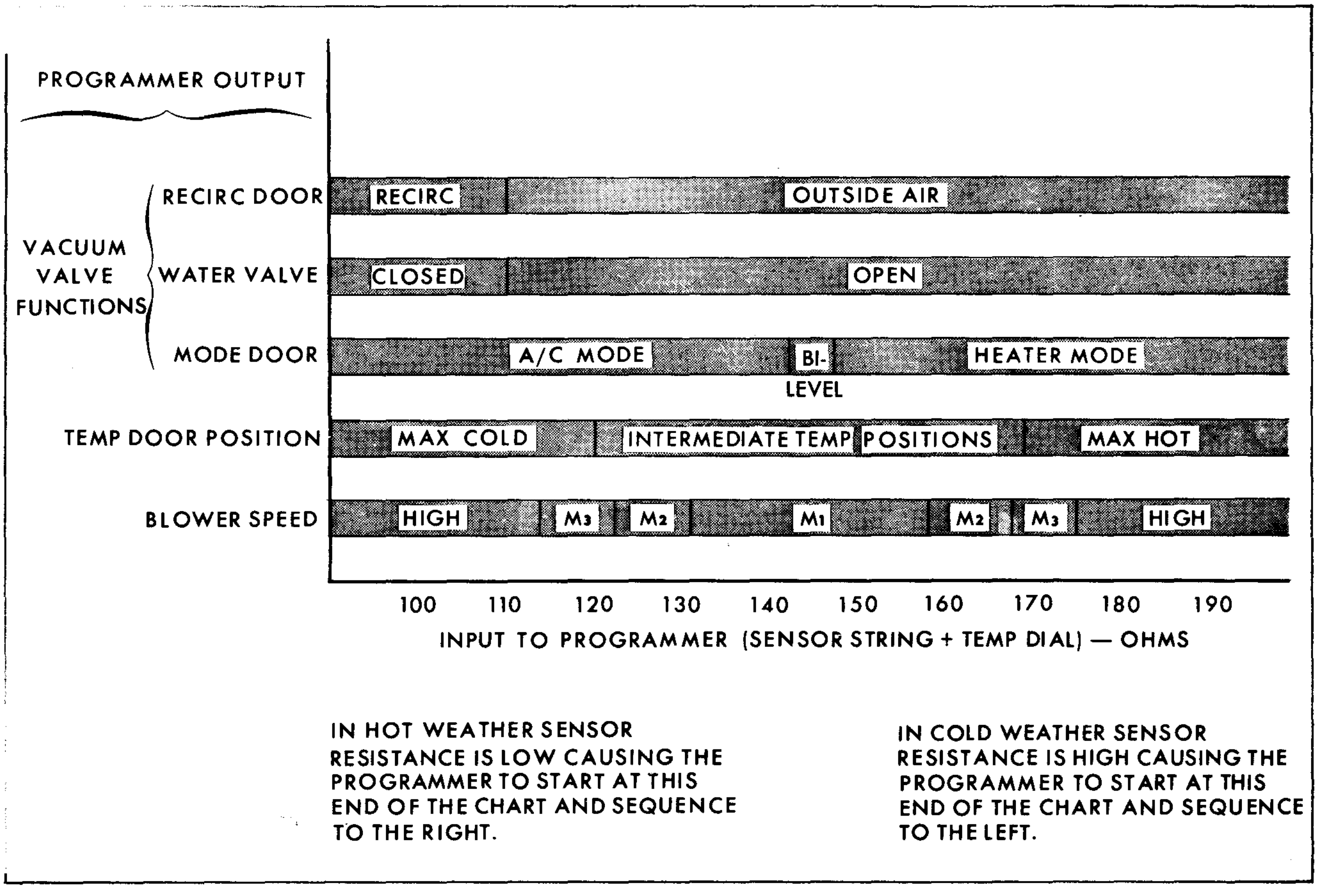


Fig. 1-29 Programmer Input-Output Chart

output current to increase which would cause the transducer output vacuum to the vacuum motor to decrease so that the new point of operation would be at the 130 ohm point in Fig. 1-29, producing M_2 blower speed and colder discharge air. The system would still be in A/C mode, with the water valve open, utilizing outside air. In this way, the in-car temperature is maintained at 75° despite the change in ambient temperature.

3. If heat load on the car were to be decreased, by driving under cloud cover, for example, the in-car sensor temperature would tend to decrease. This would cause its resistance to increase so that the total resistance to the programmer would increase. This would cause the programmer to move back to the right on the chart to a warmer position.

Note in the foregoing examples that an increase in amplifier output current cause a decrease in transducer output vacuum. Understanding this and similar relationships is important in problem diagnosis - for that reason they are listed below.

- Hot sensors result in low sensor string resistance which results in high amplifier output current which results in low transducer output vacuum which positions the vacuum motor in the cool or cold area of operation.
- Conversely, cold sensors operate at high resistance which results in low amplifier output which causes a high transducer vacuum which positions the vacuum motor in the warm or hot area of operation.

It is worth noting that an open sensor (disconnected, etc.) would represent a high resistance (as though the sensor were very cold) which would drive the programmer to maximum heat, while a shorted sensor would produce low resistance and drive the system to "Max A/C".

Amplifier and Transducer Operation

To complete the explanation of the temperature control circuit, a detailed description of amplifier and transducer operation is given below.

The amplifier circuit is shown in Fig. 1-30. The sensors, the temp dial and the feedback pot form the lower leg of a voltage divider circuit that runs from junction A to the base of Q1 to ground. The upper leg is R12. R13, R15 and D1 also form another voltage divider circuit from junction A to ground that results in a fixed voltage on the emitter of Q1. During stabilized operation of the system, the voltage difference between the base and emitter remains constant so that Q1 conducts a constant amount of current.

This current (electron flow) in Q1 actually flows from ground through the E-B diode of Q3, through the E-B diode of Q2 and through Q1. This current flow forward biases Q2 and Q3, the Darlington amplifier, and causes it to conduct. This results in a constant current flow through the transducer which produces a constant vacuum output.

If the resistance of a sensor increases as a result of a

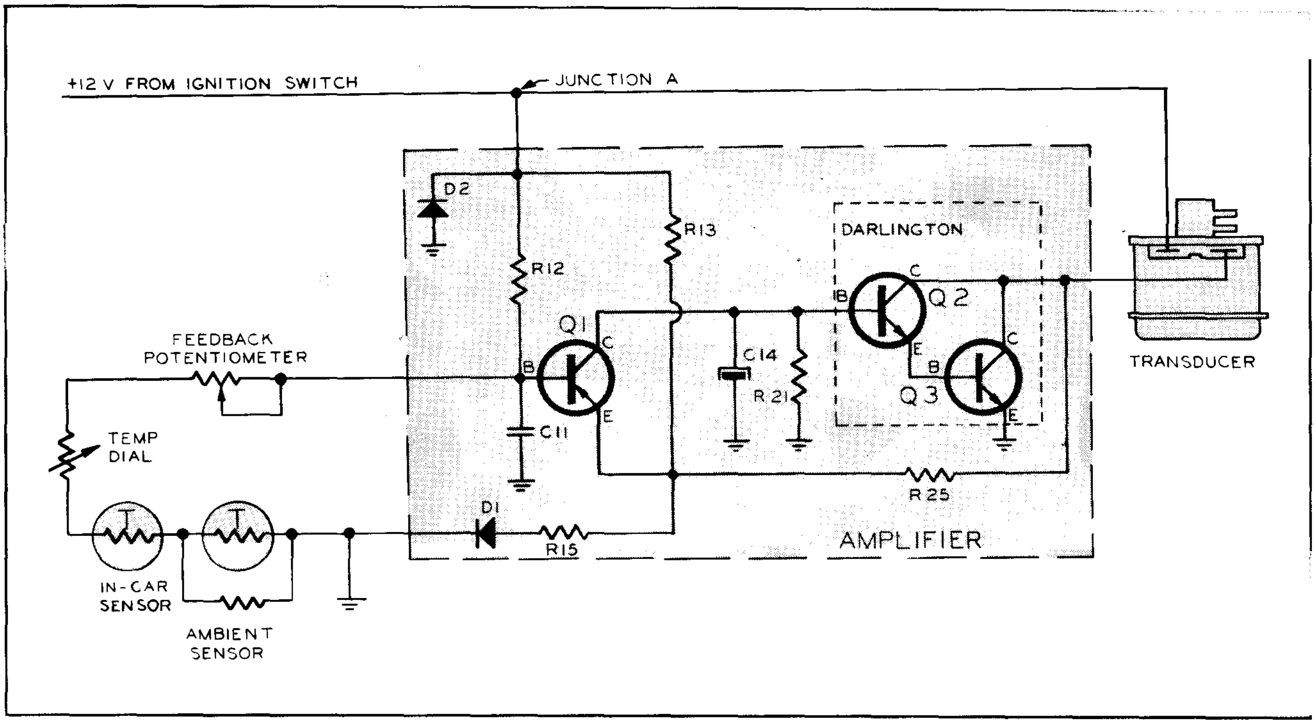


Fig. 1-30 Amplifier Circuit

temperature decrease or if the temp dial resistance is increased by dialing a higher temperature, the resistance of the lower leg of the voltage divider circuit will be greater so that the voltage at the base of Q1 will be greater. This reduces current flow through Q1 which in turn reduces the conduction of the Darlington amplifier so that transducer current decreases. This drop-off in transducer current produces a higher transducer output vacuum which drives the vacuum motor in the direction of "More Heat". As the vacuum motor moves, it rotates the feedback pot so that its resistance decreases. This produces a cancelling effect to the increased resistance which initially started the control activity. When the feedback pot completely offsets the initial resistance increase, the voltage at the base of Q1 is the same as it was earlier, and vacuum motor movement stops.

If the resistance of a sensor decreases or the temp dial is moved to a lower setting, the voltage at the base of Q1 will decrease. More current will now flow through Q3, Q2 and Q1. The increased current flow through Q1 causes the Darlington amplifier to conduct more transducer current. This results in lower transducer output vacuum which causes the vacuum motor to move toward "Max A/C". As the vacuum motor moves, the feedback pot increases in resistance, offsetting the original resistance decrease. The amplifier has now stabilized again and the movement stops.

Capacitor C11 at the base of Q1 filters out high-frequency AC signals which might cause erratic operation of the system. Capacitor C14 controls the reaction time of the amplifier and helps to stabilize its operation, eliminating oscillations. R25 is a feedback resistor that reduces the gain of the amplifier and produces more stable operation.

Diode D1 is located physically under the Darlington amplifier. When the Darlington heats up, it tries to conduct more current. D1, however, also heats up and reduces its resistance. This lowers the emitter voltage of Q1 and reduces its conduction. This results in a lower conduction of the Darlington, thereby bringing it back to its original conduction level. Diode D2 prevents voltage spikes from the input supply line from entering the amplifier.

The transducer, shown in Fig. 1-31, is actually a solenoid with a vacuum-regulating valve connected to the top end of the plunger located inside the windings. The plunger is positioned inside the windings depending on the amount of current flow passing through the windings from the amplifier. It is spring-loaded downward so that with no current flow, it is partially pulled out of the windings with the result that the pin at the top of the plunger is also pulled downward. This opens the port at seat A so that control vacuum is high, approaching raw vacuum level. When current flows through the windings, the plunger moves up into the coil so that the pin tends to seat at A and to become unseated at B. When it unseats at B, small amounts of air bleed in reducing the control vacuum level. With full current to the coil, the pin is fully seated and sealing at A and is fully open at B so that control vacuum is zero.

b. Blower Control Circuit

Three modes of blower speed control are available to the customer.

1. Fixed low blower speed
2. Four blower speeds automatically controlled by the programmer, ranging from M_1, which is slightly higher than the fixed low speed, through M_2 and M_3 to high.
3. Fixed high blower speed (approximately the same as the high in the automatic range).

Blower turn-on occurs in the following ways:

1. Delayed turn-on in cold weather until warm water is available from the engine.

2. Immediate turn-on in warm weather when the car interior is warm, regardless of engine water temperature.

3. Immediate turn-on regardless of temperatures, by owner override to the "Vent" or "Def" lever settings.

How turn-on and speed control are achieved at each of the seven lever settings is explained beginning on page 1-36.

c. Auxiliary Electrical and Vacuum Functions

The Compressor Clutch Circuit is shown in Fig. 1-47. When the ignition switch is closed, current flows through two pads on the control head which are inter-connected at all lever settings except "Off" and "Vent" and through the compressor ambient switch, which is closed above approximately 32°, to the compressor.

Auxiliary vacuum circuits are those which provide vacuum to operate the various air doors and the heater water valve. They do not include vacuum circuitry connected with the transducer and vacuum motor which functions independently and was explained in a previous section and shown in Fig. 1-28. The auxiliary vacuum circuits are best understood not by examining them all at one time in a complete circuit, but by tracing through each functional sub-circuit, as will be done beginning on page 1-52.

Complete Vacuum Circuit Diagram

A complete vacuum circuit diagram is shown in Fig. 1-54. Included are "clocks" which show the internal

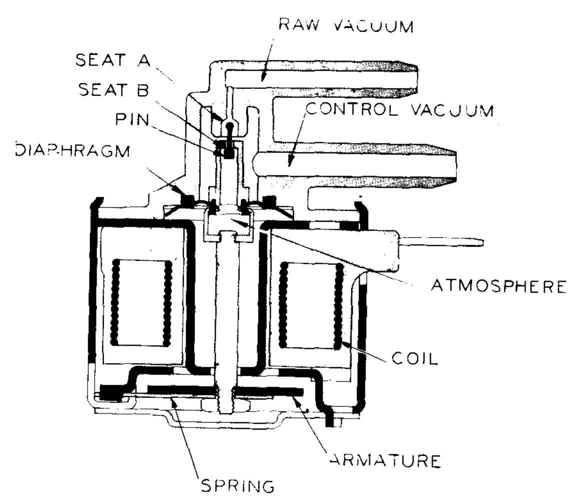


Fig. 1-31 Electromagnetic Transducer

connections of the programmer and control head vacuum valves at various positions and settings.

Complete Electrical Circuit Diagrams

Fig. 1-47 shows a complete circuit diagram in a form to permit easy tracing of circuits. Fig. 1-55 is a wiring circuit diagram that shows actual wiring arrangements, such as connectors, bulkhead connectors, location of splices, etc. The two circuits are in agreement in everything except the form in which they are presented. If there is any question regarding correctness of connections, use Fig. 1-55.

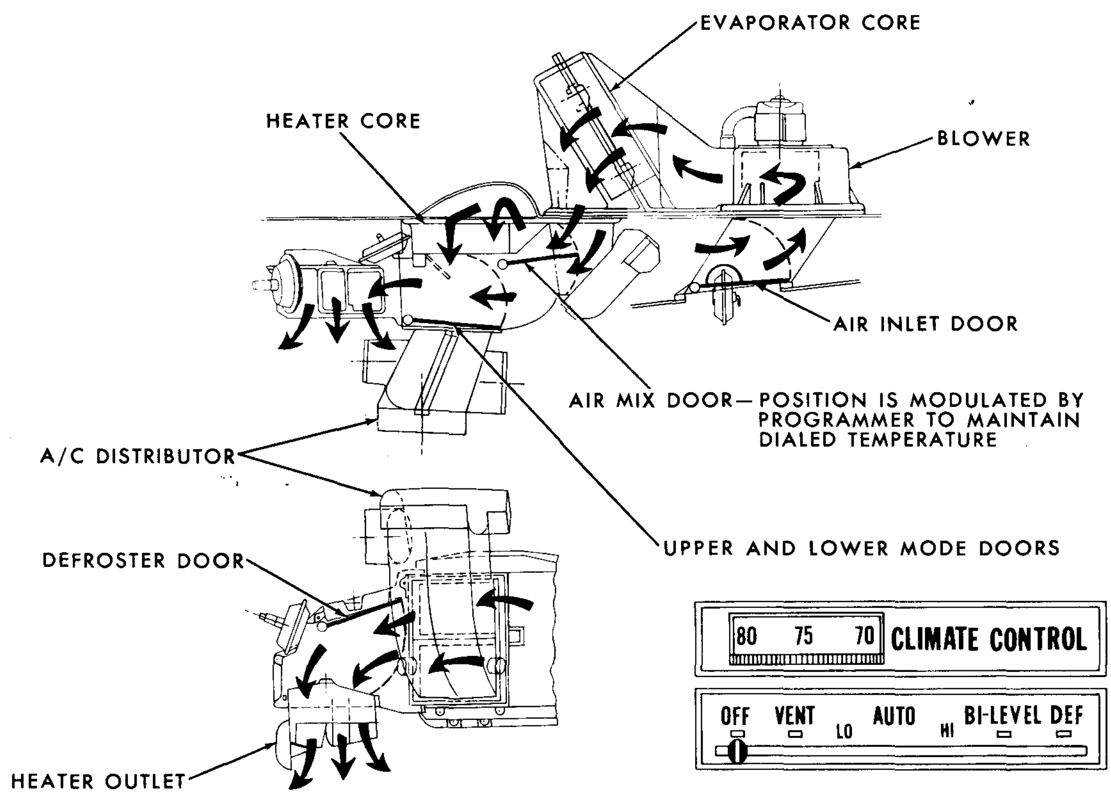


Fig. 1-32 Air Flow At "Off"

OFF - Outside air is circulated at a fixed low blower speed through the evaporator and heater assembly and discharged into the passenger compartment from the heater outlet when the ignition switch is in the "Run" position if turn on requirements are met. The temperature of the air is modulated to maintain the temperature on the dial; the ability of the system to maintain this temperature in warm weather is restricted, however, since the compressor is disengaged at this setting.

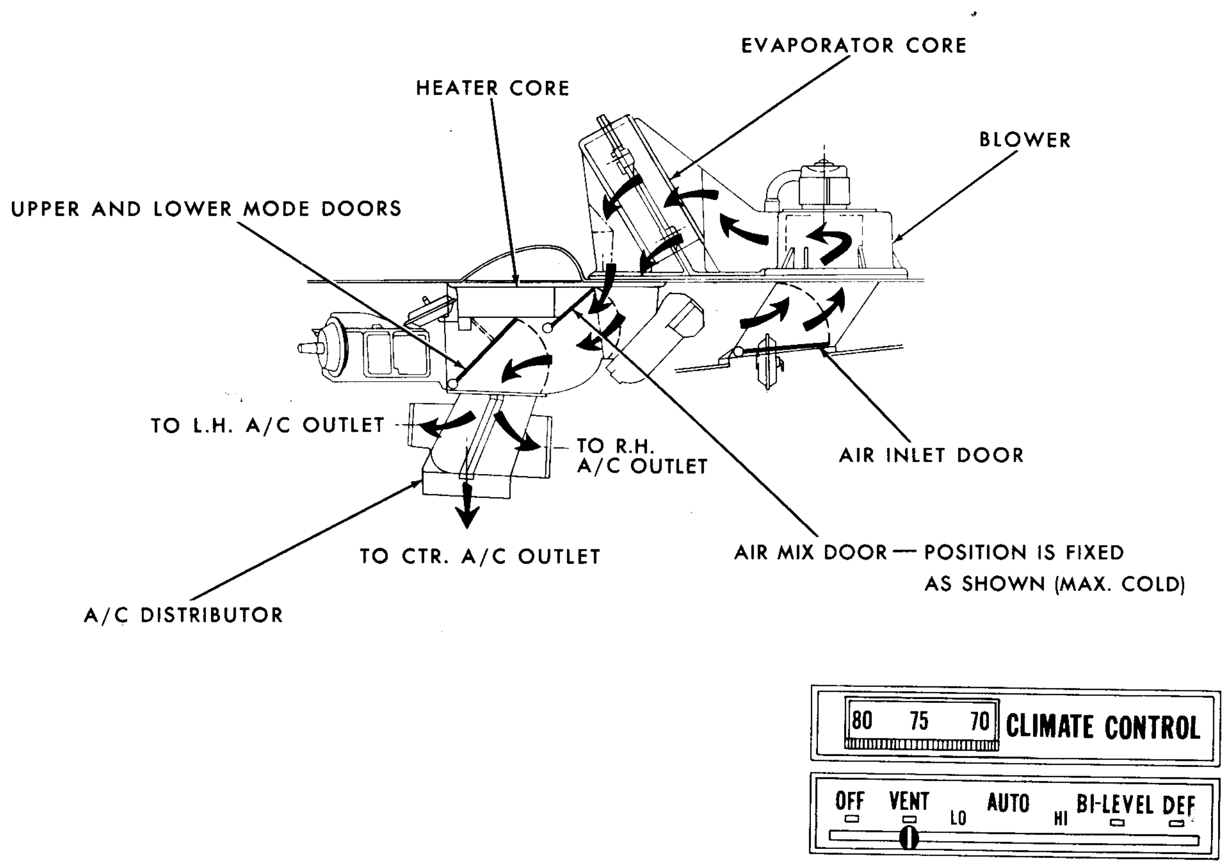


Fig. 1-33 Air Flow At "Vent"

VENT - Unheated, uncooled outside air is delivered from the air conditioner outlets at a fixed low blower speed. The compressor is inoperative and the heater water valve is closed. There is no delay for engine water warm up.

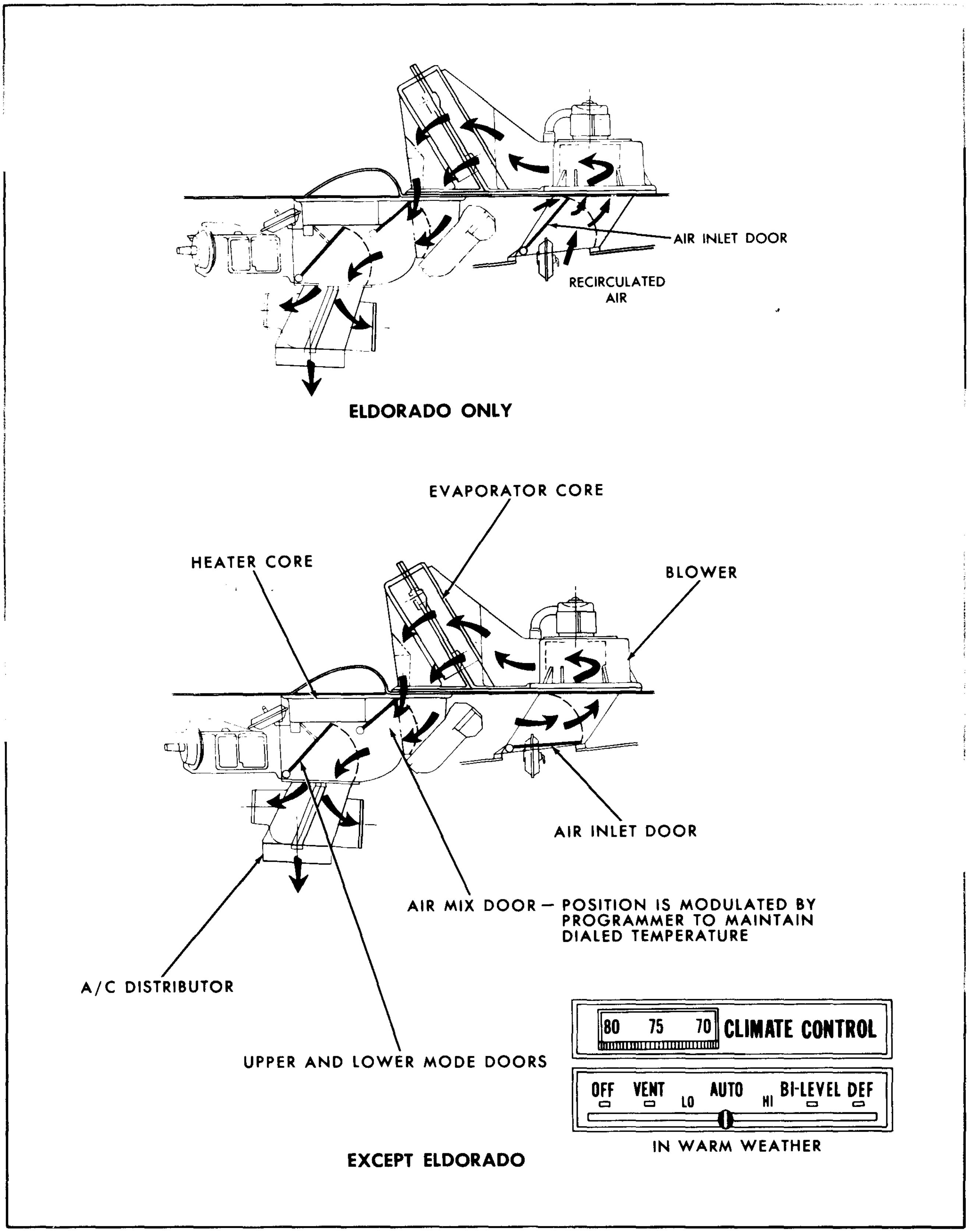


Fig. 1-34 Air Flow At "Auto"-Warm Weather

LO - Operation at this setting is identical to that provided at "Auto" (see page 1-39), except that the blower operates at a fixed low speed.

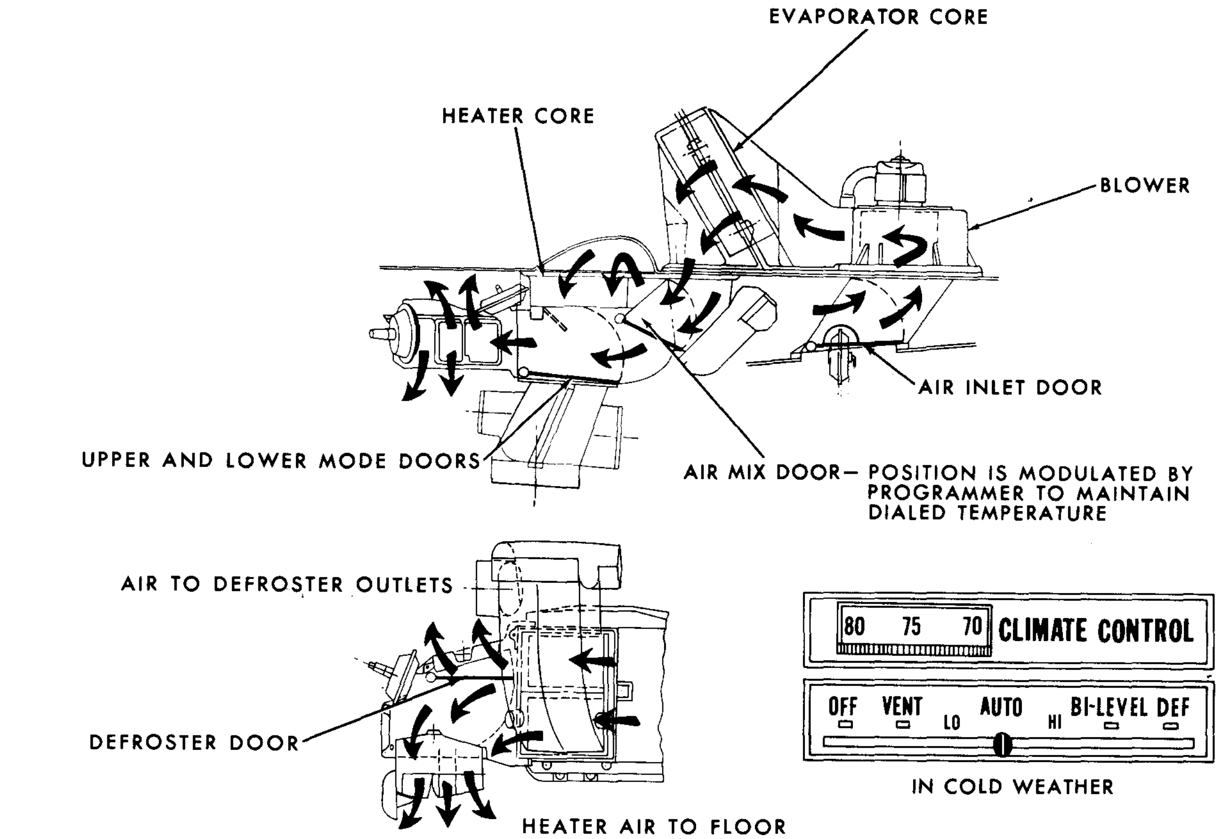


Fig. 1-35 Air Flow At "Auto"-Cold Weather

AUTO - Regulation of blower speed, discharge air temperature, air delivery mode, system turn-on and compressor operation is accomplished automatically to maintain the temperature on the dial and to provide comfort.

Four blower speeds, HI, MED_3, MED_2, and MED_1 are utilized. If the car interior is significantly hotter or colder than the temperature on the dial, the blower will start at high and then sequence down to lower speeds as the dial temperature is approached.

Discharge air temperature will be varied automatically between approximately 45° and 150°. If the discharge air temperature is above approximately 90°, the air will be delivered from the heater outlet (Fig. 1-35); below approximately 75° it will be delivered from air conditioner outlets. Between these temperatures, air is provided from both the heater and air conditioner outlets (Bi-Level operation).

If the car interior is above approximately 75°, the system will turn on immediately when the car is operated. If the car is below 75°, system turn-on will be delayed, if the engine is cold, until engine water reaches approximately 120°.

Compressor operation is provided at all ambient temperatures above approximately 32°F even when not required for cooling, to assure maximum dehumidification of the air.

Outside air is utilized as air supply for the system except on Eldorado when maximum A/C is called for.

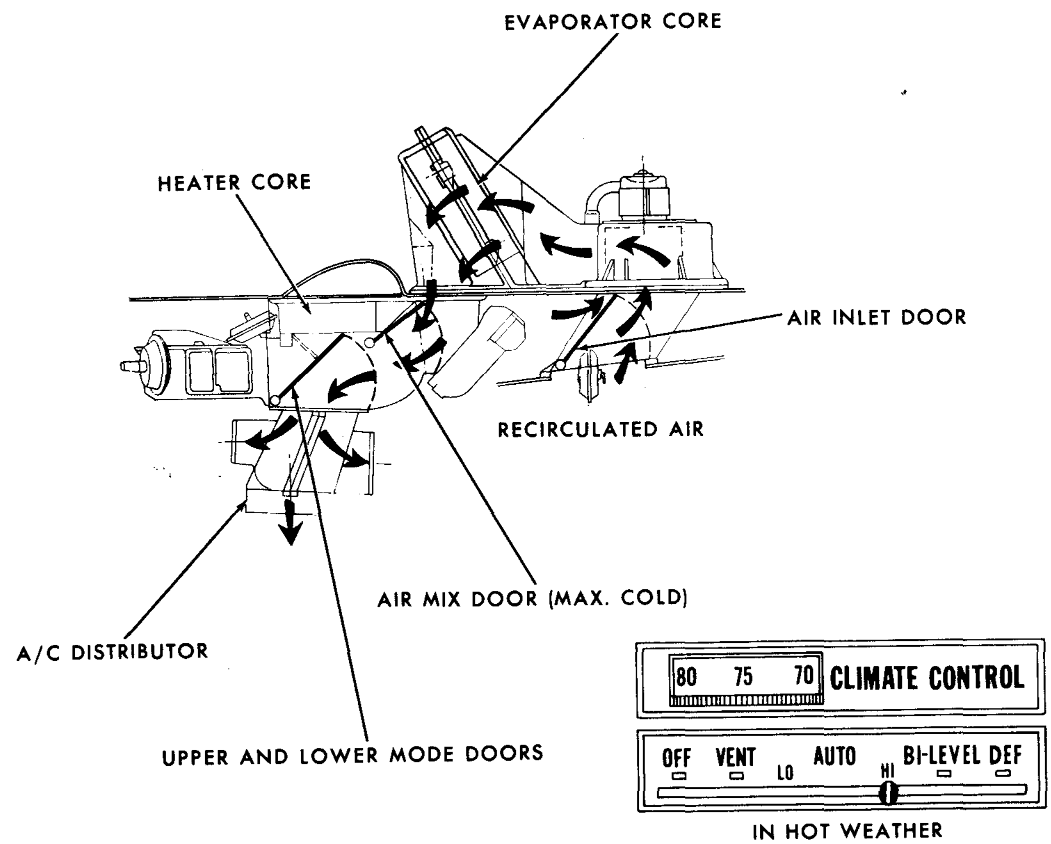


Fig. 1-36 Air Flow At "Hi"

HI - Operation at this setting is identical to that provided at "Auto" except that the blower operates at a fixed maximum speed and recirculated air is used when maximum cooling is required. This setting is provided for quickest possible cool down under extremely hot ambient conditions.

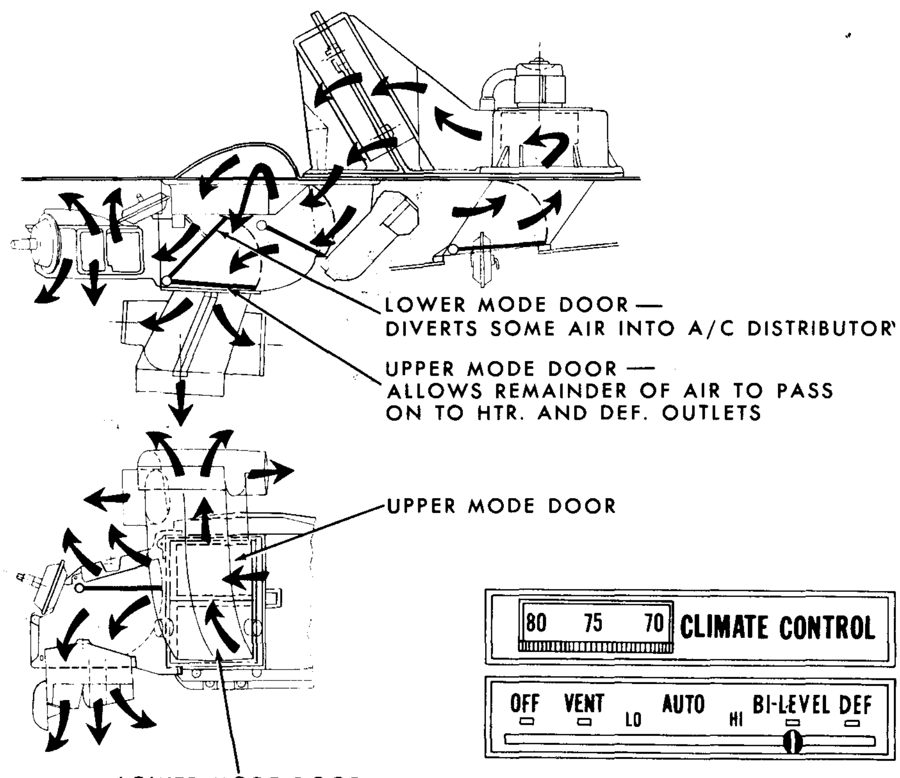


Fig. 1-37 Air Flow At "Bi-Level"

BI-LEVEL - Operation at this setting is the same as at "Auto" except bi-level air delivery is provided -- approximately half the air is delivered from the heater outlet and the other half is discharged from the air conditioner outlets. This provides a pleasant, draft-free mode of operation in mild weather; it also permits defrosting of the side windows by the air streams from the end air conditioner outlets in cold weather.

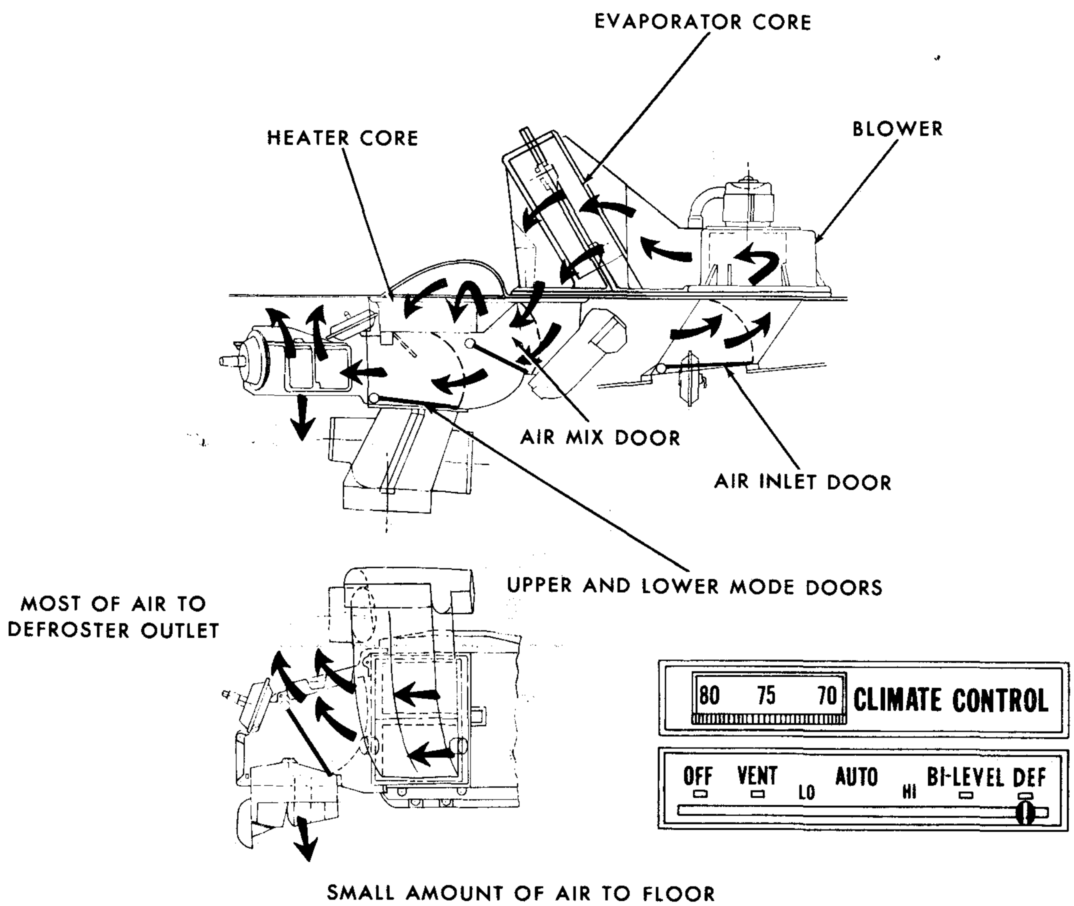


Fig. 1-38 Air Flow At "Def"

DEF - At this setting all the air is delivered to the windshield and the blower operates at a fixed high speed. Temperature regulation is maintained. Blower turn-on is immediate, even with a cold engine.

How the system operates at the various lever settings is depicted in organized fashion in the chart in Fig. 1-39.

<table>
<tr><th colspan="2"></th><th colspan="8">SYSTEM RESPONSE</th></tr>
<tr><th colspan="2"></th><th>BLOWER SPEED</th><th>AIR INLET DOOR POSITION</th><th>TEMPERATURE DOOR POSITION</th><th>MODE DOORS POSITION</th><th>DEFROSTER DOOR POSITION</th><th>COMPRESSOR</th><th>HTR-WATER SHUT-OFF VALVE</th><th>IS BLOWER DELAYED FOR ENGINE WATER WARMUP?</th></tr>
<tr><td rowspan="7">CONTROL LEVER SETTINGS</td><td>OFF</td><td rowspan="3">FIXED LOW
5.0V – HTR
4.5V – A/C</td><td rowspan="3">OUTSIDE AIR</td><td>VARIES – RESPONSIVE TO SENSORS</td><td>FORCED TO HEATER</td><td>SEALED</td><td rowspan="2">DOESN'T OPERATE</td><td>USUALLY OPEN – EXC. CLOSED AT MAX. A/C</td><td>YES*</td></tr>
<tr><td>VENT</td><td>FORCED TO MAX. A/C</td><td>FORCED TO A/C</td><td rowspan="5">DOOR WILL ASSUME "BLEED" POSITION AFTER 45 SECOND DELAY AND WILL DELIVER BLEED AIR TO W/S IF IN HEATER OR BI-LEVEL MODE</td><td>CLOSED</td><td>NO – BLOWER IS TURNED ON BY O'RIDE SW.</td></tr>
<tr><td>LO</td><td rowspan="5">VARIES – RESPONSIVE TO SENSORS</td><td rowspan="3">EITHER HEATER, BI-LEVEL OR A/C DEPENDS ON PROGRAMMER POSITION</td><td rowspan="5">OPERATES ABOVE APPROX. 32°</td><td rowspan="3">USUALLY OPEN – EXC. CLOSED AT MAX. A/C POSITION OF PROGRAMMER</td><td rowspan="4">YES*</td></tr>
<tr><td>AUTO.</td><td>VARIABLE BLOWER PROGRAM</td><td>RECIRCULATE ON ELDORADO ONLY</td></tr>
<tr><td>HI</td><td>FIXED HI - 13.5 V</td><td rowspan="3">RECIRCULATE AIR WHEN PROGRAMMER IS AT MAX. A/C - OTHERWISE OUTSIDE AIR</td></tr>
<tr><td>BI-LEVEL</td><td>VARIABLE BLOWER PROGRAM</td><td>BI-LEVEL</td><td rowspan="2">OPEN</td></tr>
<tr><td>DEF</td><td>FIXED HI - 13.5 V</td><td>FORCED TO HEATER</td><td>FULL OPEN TO W/S</td><td>NO – BLOWER IS TURNED ON BY O'RIDE SW.</td></tr>
</table>

*EXCEPT WHEN CAR INTERIOR IS WARM, IN WHICH CASE A SWITCH ON THE CONTROL HEAD TURNS BLOWER ON IMMEDIATELY, EVEN IF ENGINE IS COLD.

Fig. 1-39 System Operation At Various Lever Settings

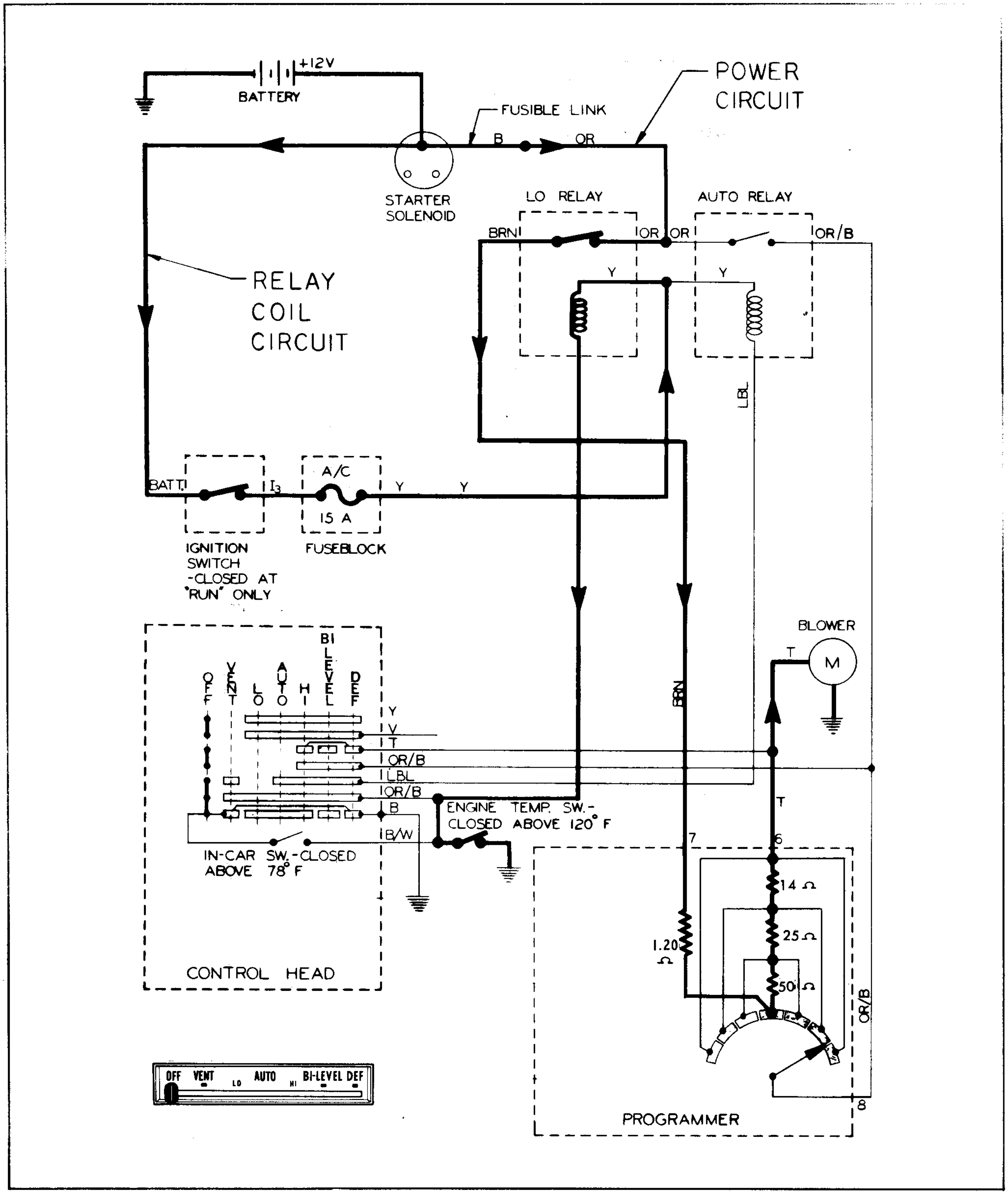


Fig. 1-40 Blower Operation At "Off"

Blower Operation at "Off" (Fig. 1-40)

When the ignition switch is closed, current flows through the "Relay Coil Circuit" to the "Lo Relay" and to ground through either the engine temperature switch or the in-car switch (in the illustration the engine switch is shown closed). In cold weather the relay could not be actuated until engine water is warm. Blower current flows through the "Power Circuit" to the "Lo Relay", through all four resistors in the programmer to the blower motor which operates at low speed. Movement of the programmer has no affect on blower speed.

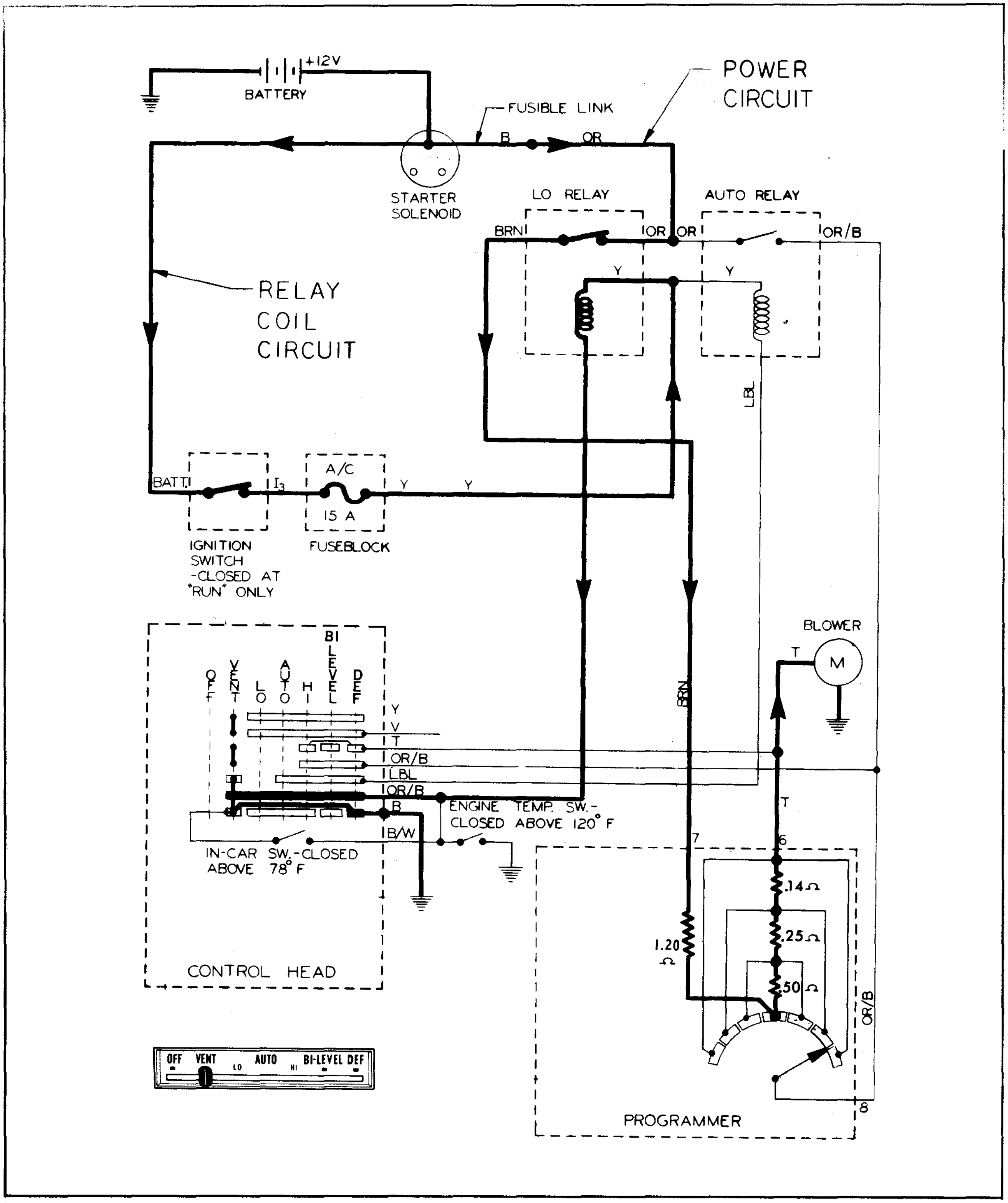


Fig. 1-41 Blower Operation At "Vent"

Blower Operation at "Vent" (Fig. 1-41)

Current flow is the same as at "Off" except that two pads on the control head circuit board switch are connected by the wiper so that current through the "Lo Relay" coil reaches ground regardless of whether the engine switch or the in-car switch are closed. This gives immediate blower turn-on. Since blower current must pass through all four resistors, the blower operates at fixed low speed.

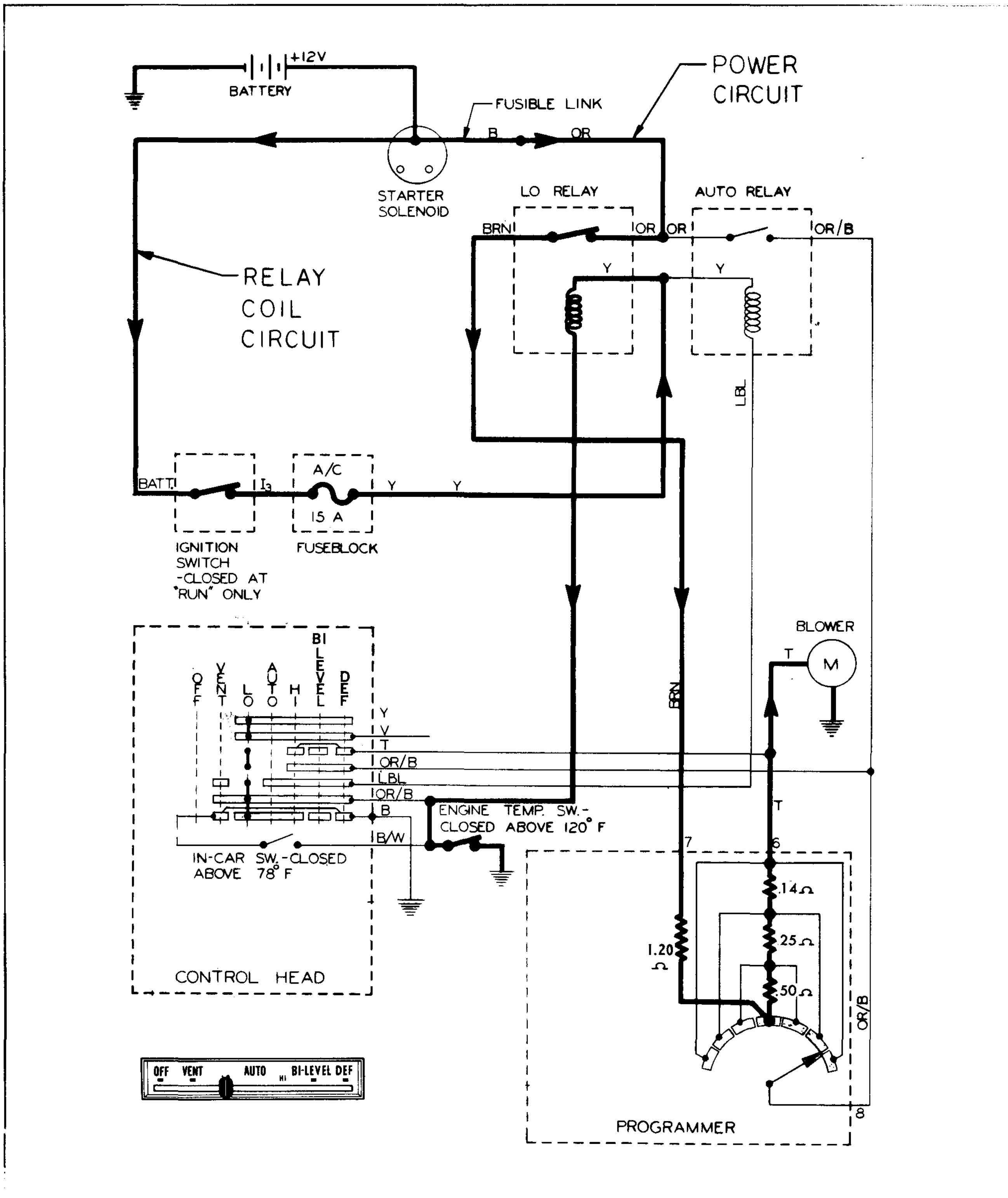


Fig. 1-42 Blower Operation At "Lo"

Blower Operation at "Lo" (Fig. 1-42)

Same as at "Off".

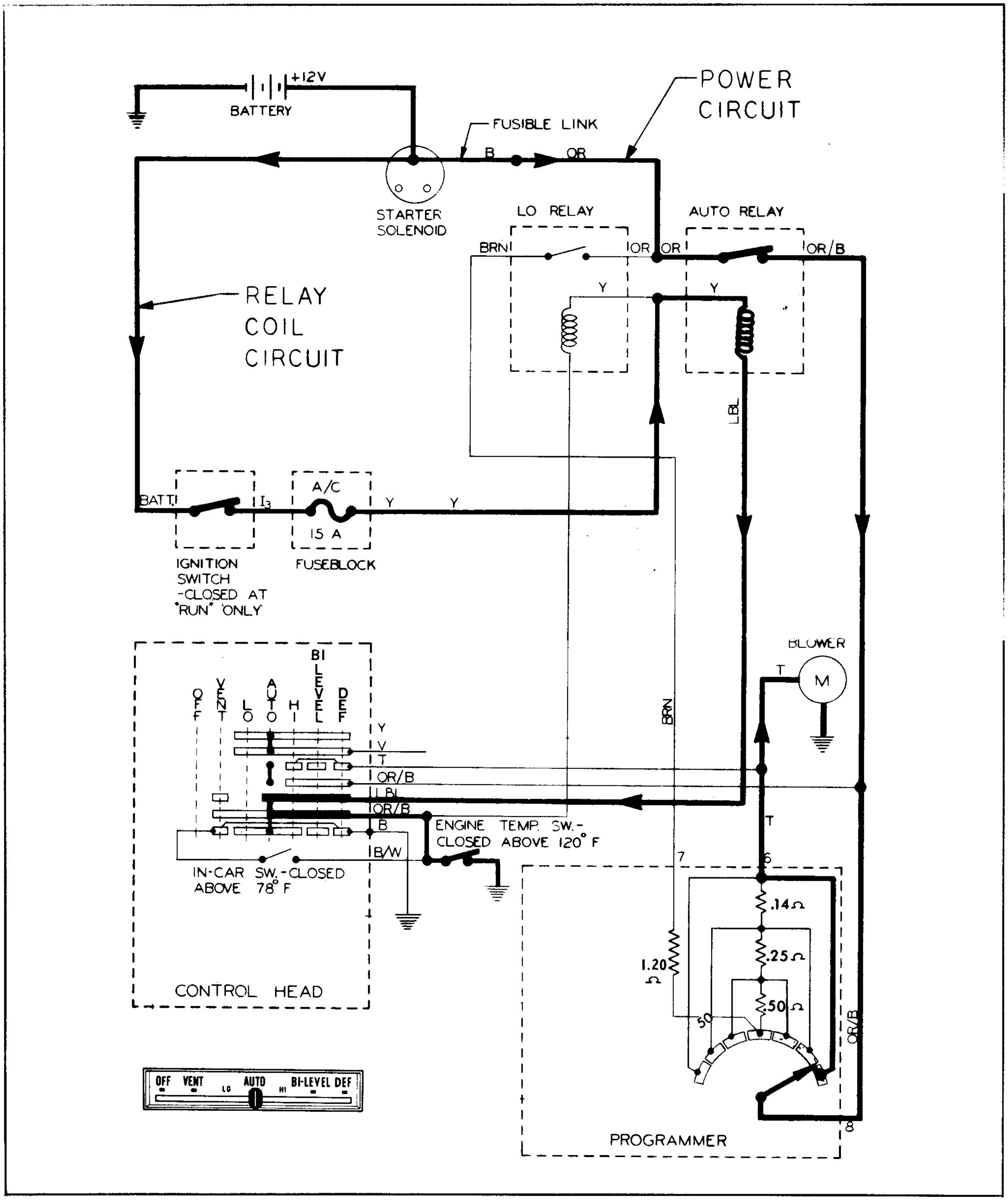


Fig. 1-43 Blower Operation At "Auto"

Blower Operation at "Auto" (Fig. 1-43)

Current flows through the relay coil circuit to the auto relay and to ground through either the engine temperature switch or the in-car switch. There is no grounding connection on the control head circuit board switch so that the blower will delay in cold weather. Blower current flows through the power circuit to the center point of the wiper on the programmer and through one, two or three resistors, depending on the position of the programmer, to the blower motor.

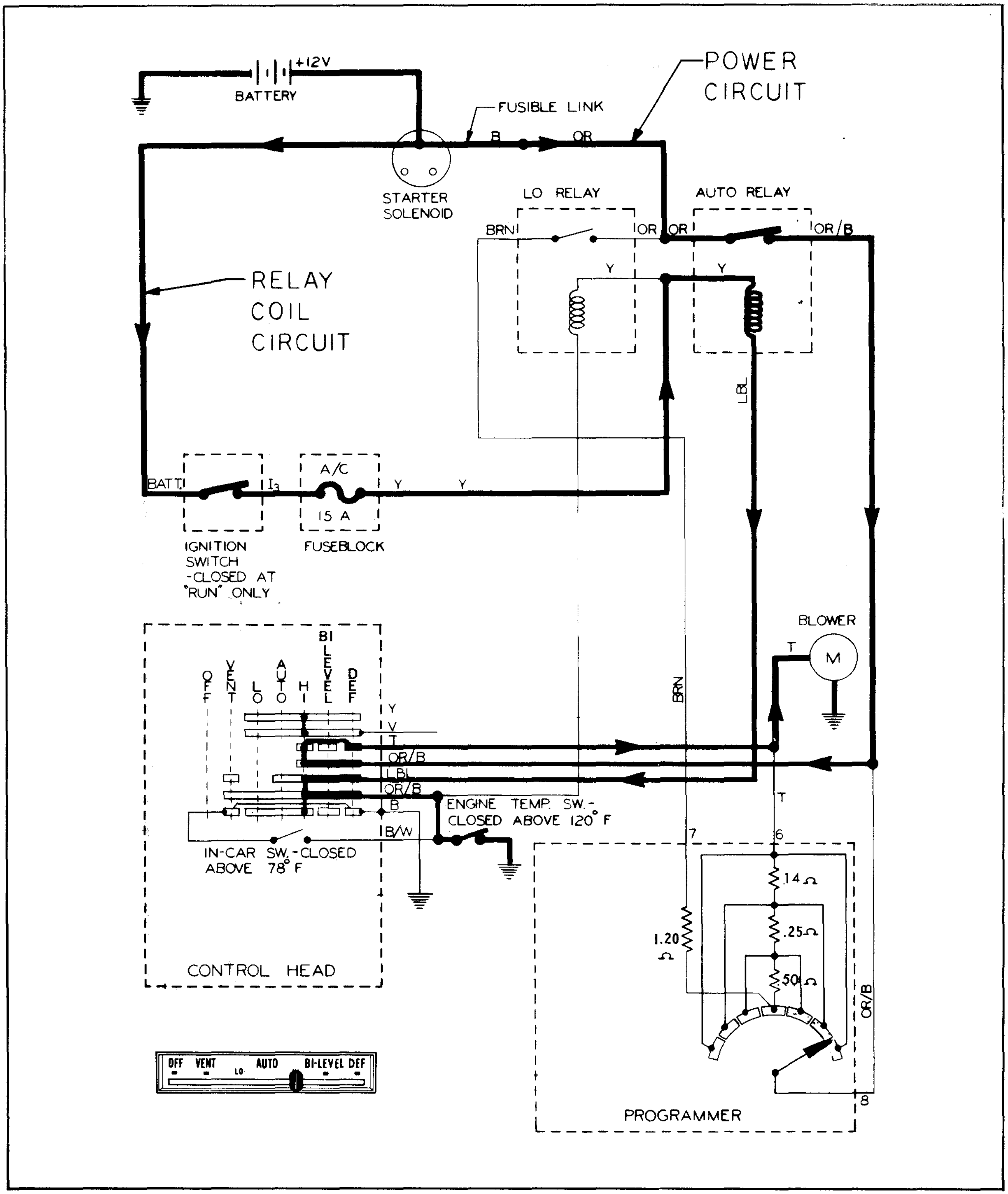


Fig. 1-44 Blower Operation At "Hi"

Blower Operation at "Hi" (Fig. 1-44)

Current flow through the relay coil circuit is the same as at "Auto". Blower current, however, does not go through the programmer but is routed through two inter-connected pads on the control head directly to the blower motor. There is no resistance in the circuit so that the blower operates at a fixed high speed, with no programmer control over its operation.

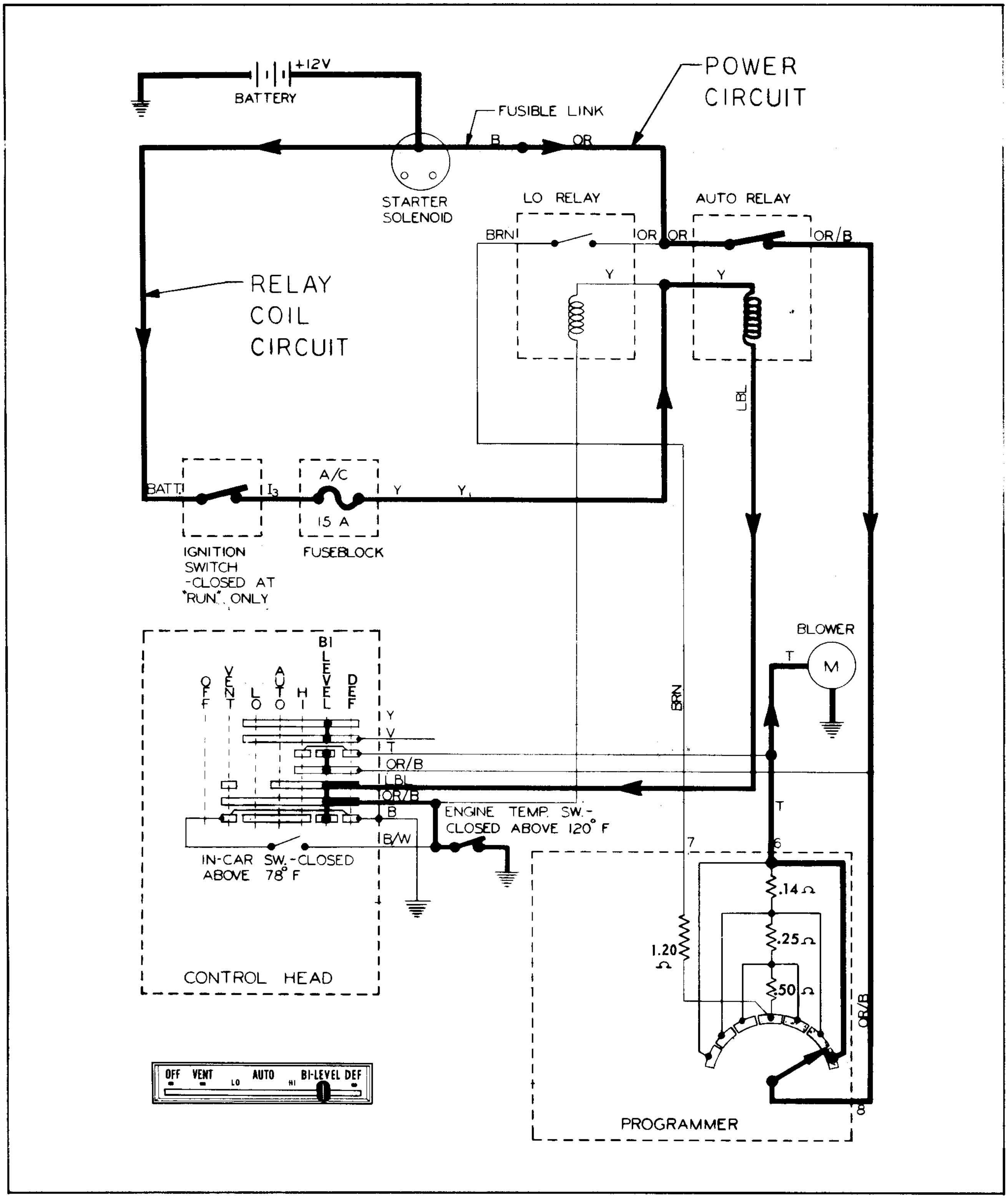


Fig. 1-45 Blower Operation At "Bi-Level"

Blower Operation at "Bi-Level" (Fig. 1-45)

Same as at "Auto".

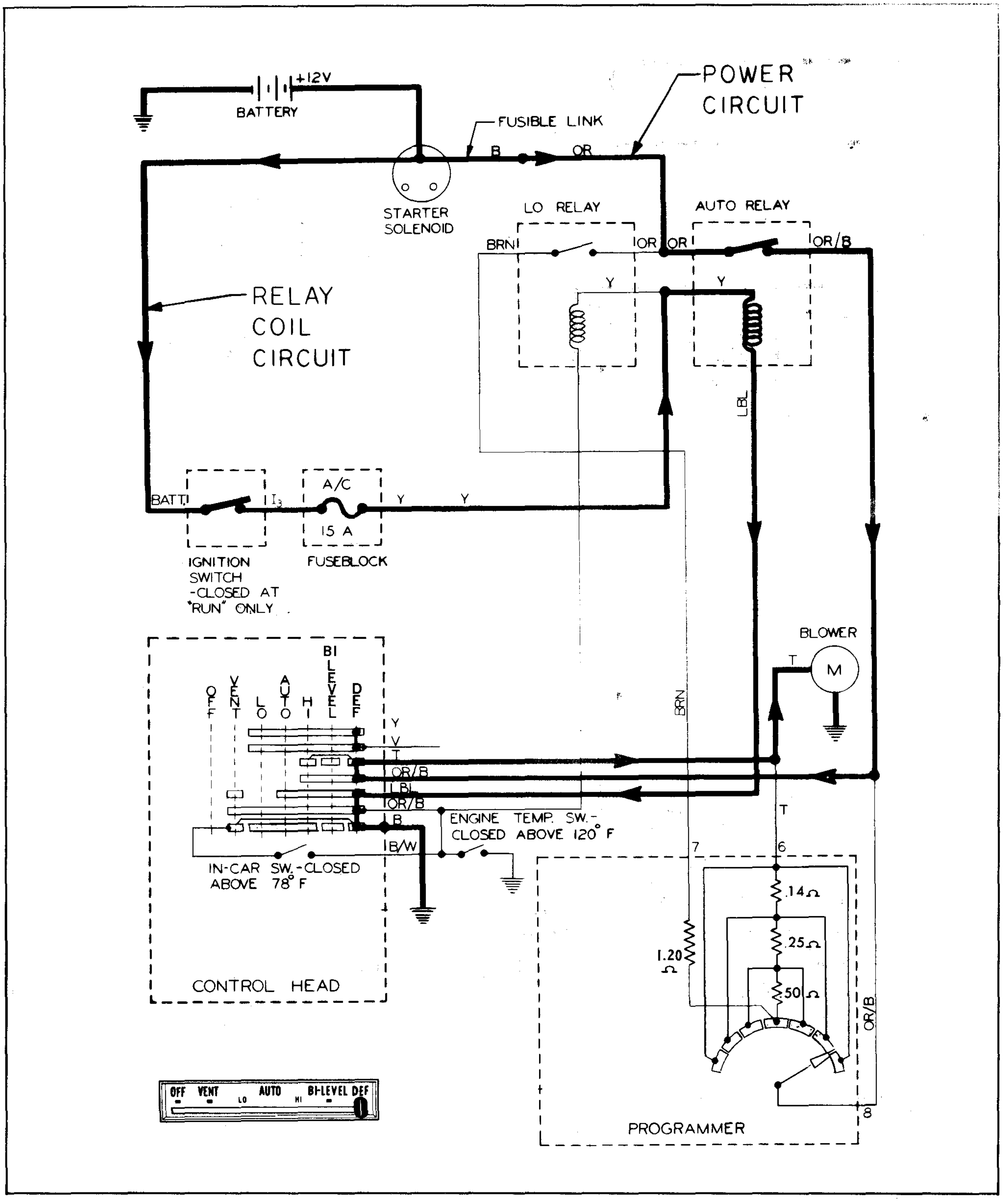


Fig. 1-46 Blower Operation At "Def"

Blower Operation at "Def" (Fig. 1-46)

The Auto Relay Coil is grounded through two pads on the control head so that there is immediate turn-on even with a cold engine. Blower current flows through the power circuit to two inter-connected pads on the control head and to the blower. The blower operates at a fixed high speed.

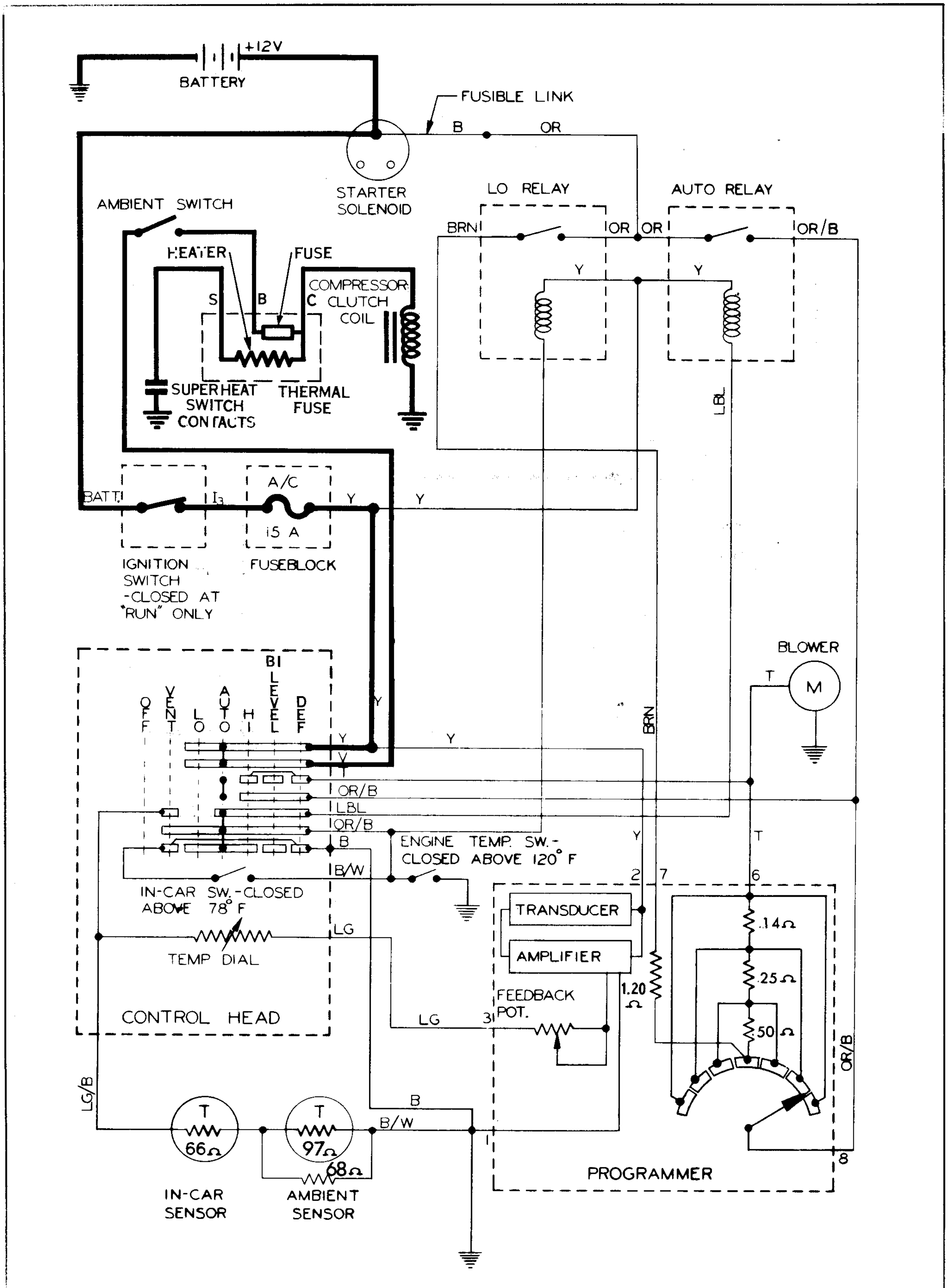


Fig. 1-47 Compressor Electrical Circuit

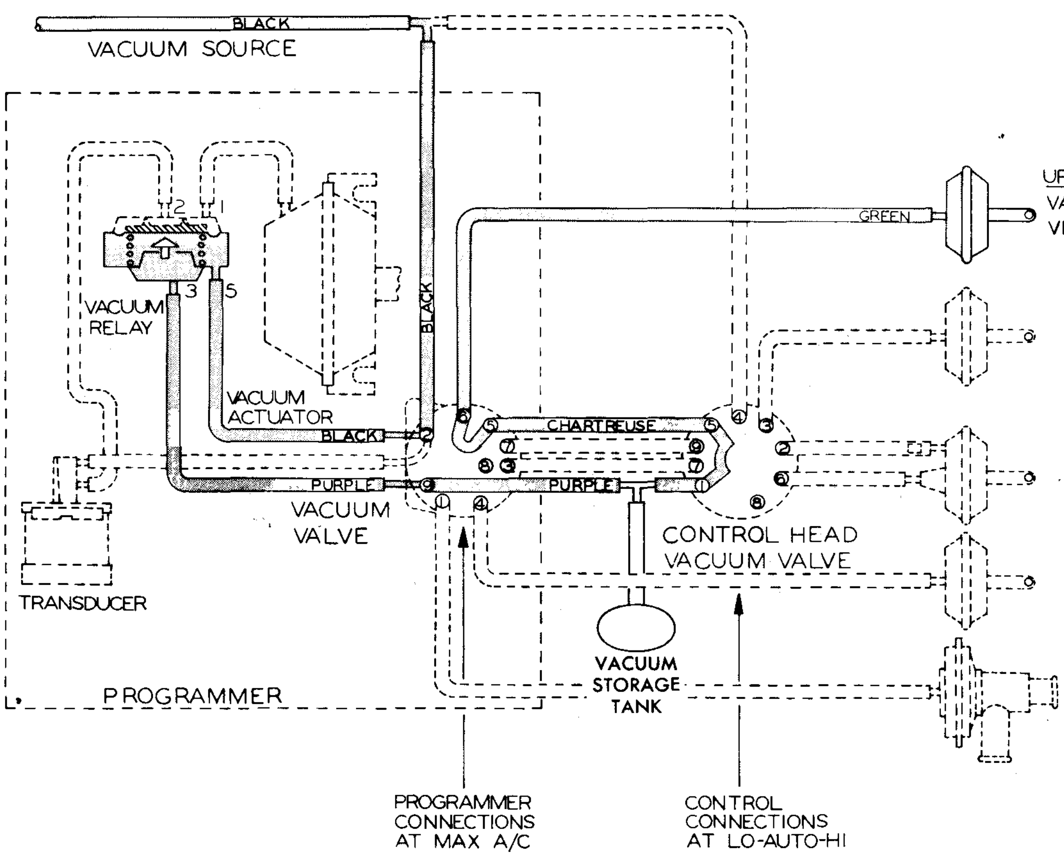


Fig. 1-48 Upper Mode Door Vacuum Circuit

Upper Mode Door Vacuum Circuit (Fig. 1-48)

The upper mode door actuator is connected by a green hose to port 6 on the programmer valve. This port is vented in the heater portion of programmer travel so that the actuator is vented which places the mode door in the heater position. When the programmer is positioned toward the "Max A/C" position, port 6 is connected to port 5, which is connected by the chartreuse hose to port 5 on the control head vacuum valve. This port is vented at "Off", "Bi-Level" and "Def" so that the door must remain in the heater position at those settings even though the programmer is positioned to produce A/C mode. At "Lo", "Auto" and "Hi", however, port 5 is connected to port 1, as is shown in the sketch. This port is connected by the purple hose to part 9, back on the programmer valve. Port 9 has checked vacuum at all times, which it receives from the check valve portion of the vacuum relay. The vacuum relay receives its vacuum from port 2 which has full vacuum at all times.

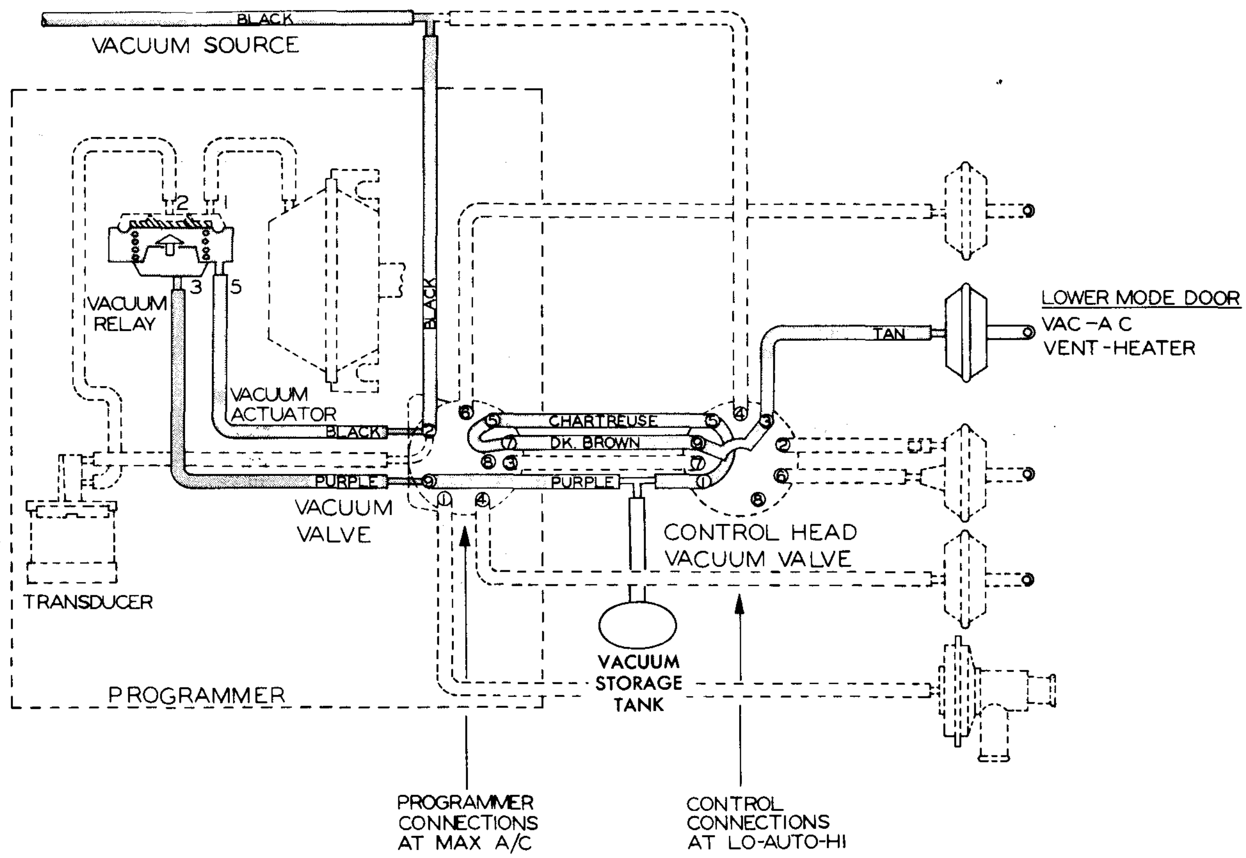


Fig. 1-49 Lower Mode Door Vacuum Circuit

Lower Mode Door Vacuum Circuit (Fig. 1-49)

The lower mode door actuator is connected by a tan hose to port 3 on the control head. Port connections in the control valve at "Lo", "Auto" and "Hi" are as shown in the sketch. At the programmer, port 5 is connected to port 7 in the A/C portion of programmer travel, as shown. Under these conditions, checked vacuum is fed to the actuator which positions the lower mode door in the A/C position. At "Off" and "Def", port 3 on the control head is vented forcing the door to heater mode. At "Bi-Level", port 3 is connected to port 1 on the control head, forcing the mode door to the A/C position regardless of the position of the programmer.

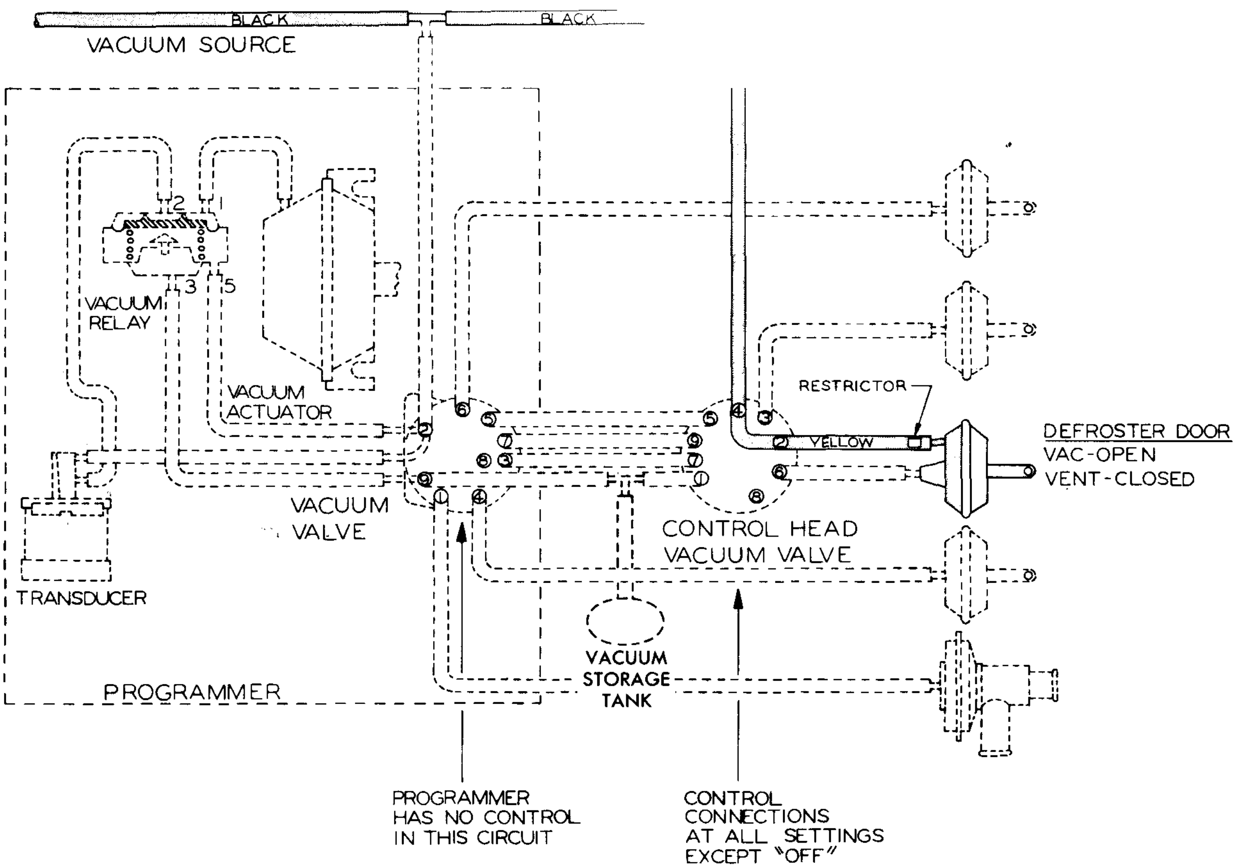


Fig. 1-50 Defroster Bleed Vacuum Circuit

Defroster Bleed Vacuum Circuit (Fig. 1-50)

To provide a small "bleed" of air to the defroster outlet in heater mode, the defroster door is open approximately .75 inch. This is accomplished by applying vacuum to the outer nipple of the two-stage defroster actuator. The outer port is connected by the yellow hose to port 2 on the control head. This port is connected to port 4 at all lever settings except "Off" in which case port 2 is vented. This provides the possibility of defroster bleed at all settings except "Off". The programmer exerts an indirect influence in this function; if it, in conjunction with the control head valve, provides vacuum to put the mode doors in the A/C positions, these doors intercept all air headed toward the defroster door and there is no defroster bleed air even though the defroster door is cracked open. Note that port 4, which feeds vacuum to the defroster bleed nipple, is connected to full engine vacuum, not checked vacuum. This is done deliberately to permit the vacuum to escape when the car is stopped so that the defroster door will seal. A restrictor is located in the yellow hose to provide a delay of approximately 45 seconds in the operation of the door. This prevents fogging of the windshield that can sometimes occur when the car is restarted.

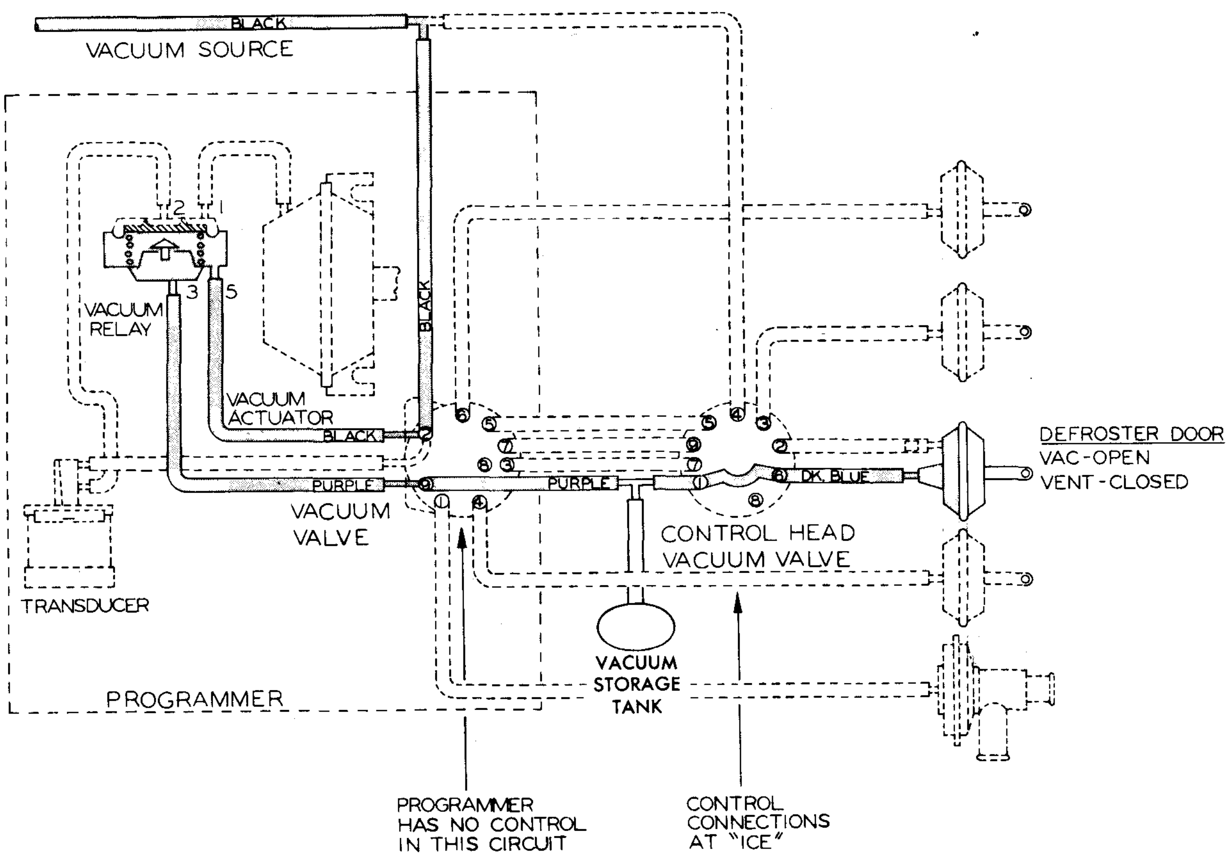


Fig. 1-51 Defroster Vacuum Circuit

Defroster Vacuum Circuit (Fig. 1-51)

The defroster door is moved full open whe: acuum is applied to the center nipple of the actuator. This nipple is connected by the dark blue hose to port 6 on the control head. This port is vented at all settings except "Def" where it is connected to port 1, as shown. The programmer has no control in this circuit.

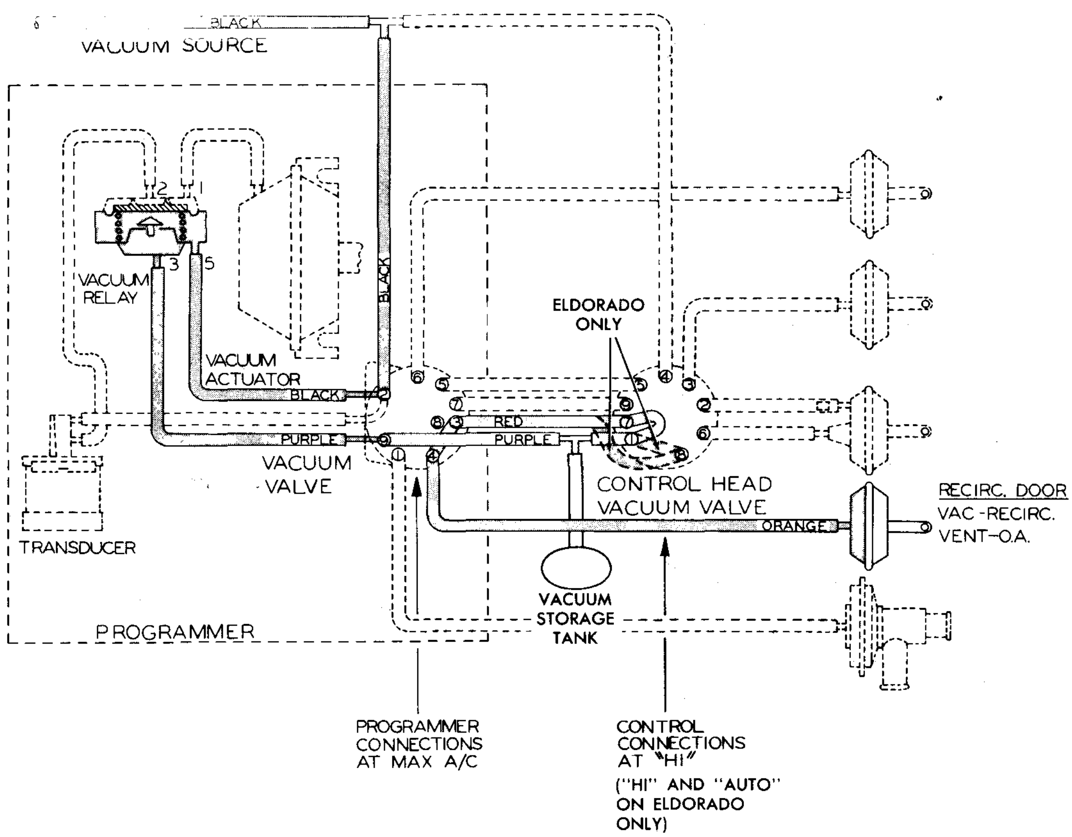


Fig. 1-52 Recirc Air Vacuum Circuit

Recirc Air Vacuum Circuit (Fig. 1-52)

The recirc air actuator is connected by the orange hose to port 4 on the programmer. This port is vented at all programmer positions except "Max A/C", resulting in outside air. At "Max A/C", port 4 is connected to port 3 which is connected by the red hose to port 7 on the control head. Port 7 is connected to checked vacuum at port 1 at the "Hi" setting (also at "Bi-Level" and "Def"), as shown. Thus, if the programmer is at "Max A/C" and the control is at "Hi", recirc air operation will be obtained. On Eldorado models, the red hose is connected to Port 8 on the control head valve to provide recirc air in "Auto" at max A/C.

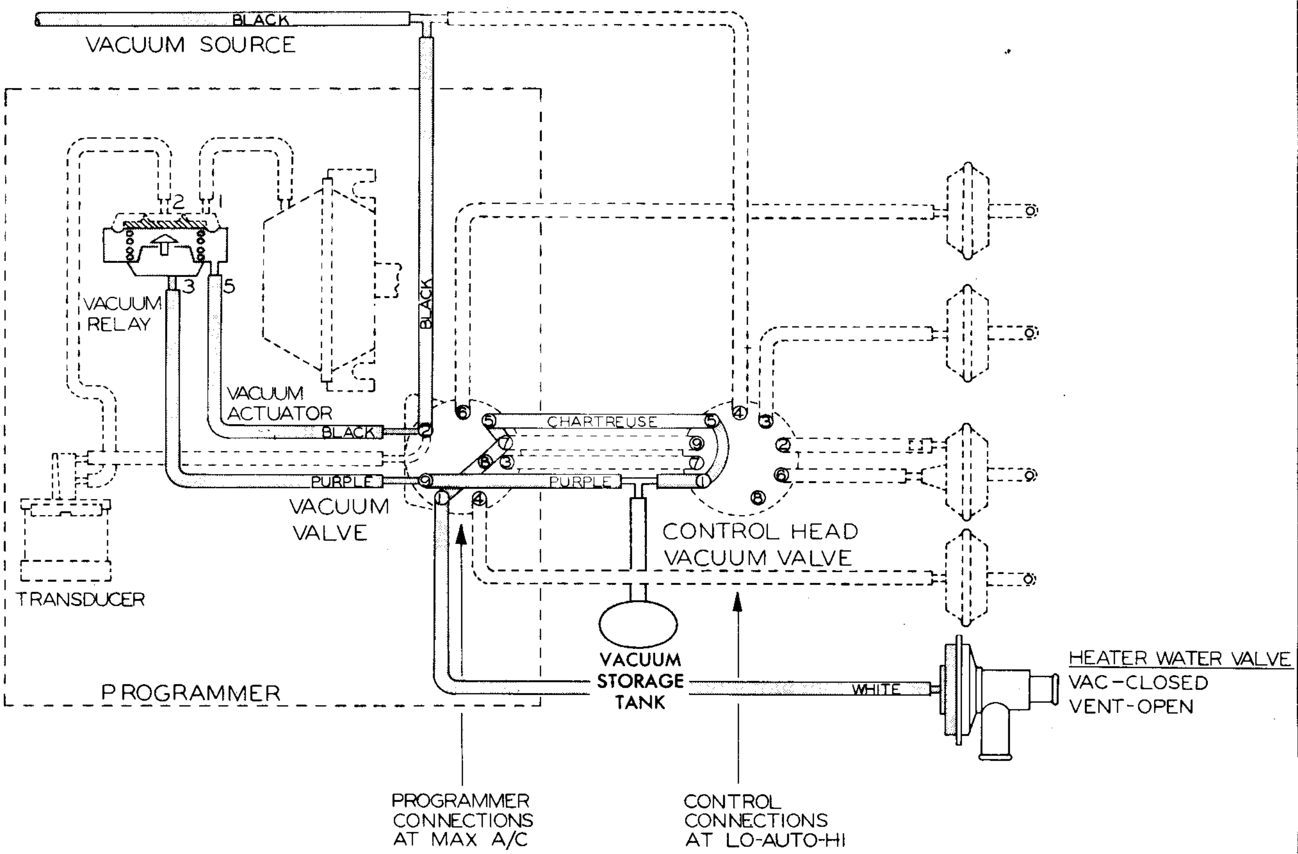


Fig. 1-53 Heater Water Valve Vacuum Circuit

Heater Water Valve Vacuum Circuit (Fig. 1-53)

The water valve is connected to port 1 of the programmer which is vented, opening the valve, at all programmer positions except at the "Max A/C" end of travel. There it is connected, as shown, to port 5 which is connected by the chartreuse hose to port 5 on the control head. At "Vent", "Lo", "Auto" and "Hi", port 5 is connected to checked vacuum at port 1, closing the valve.

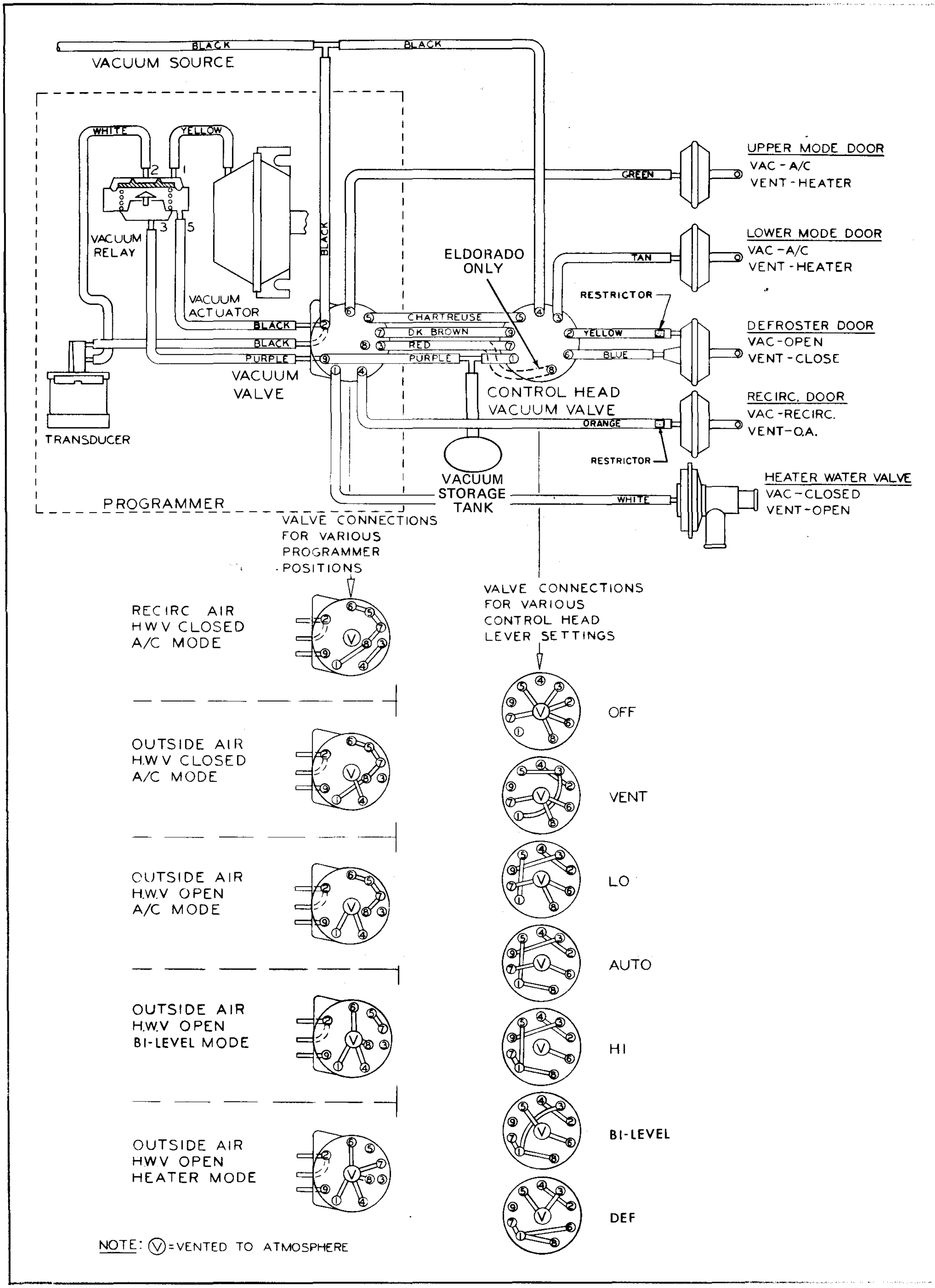


Fig. 1-54 Complete Vacuum Circuit

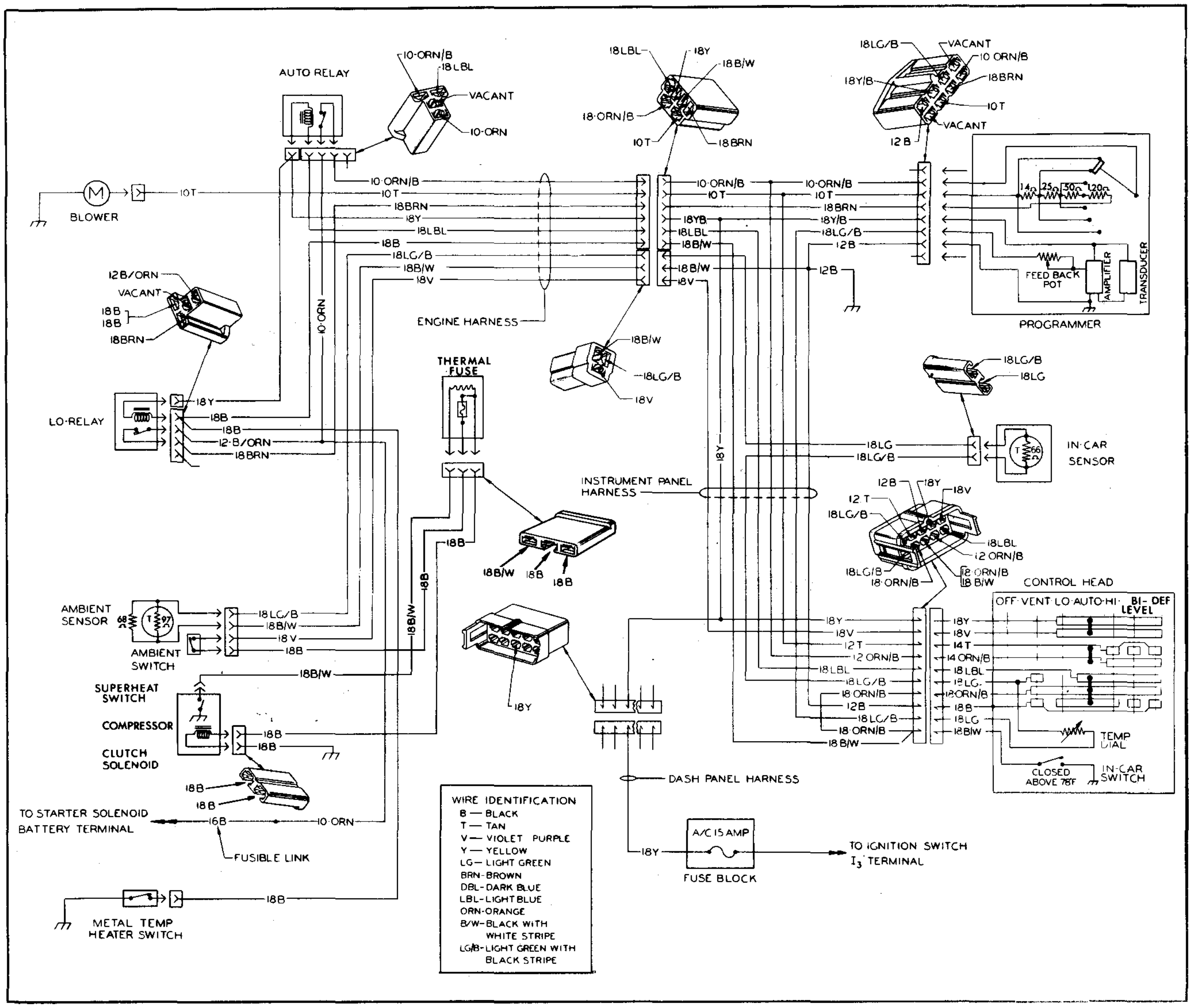


Fig. 1-55 Complete Electrical Circuit

SERVICE INFORMATION—FRONT A/C—ALL SERIES

REMOVAL AND INSTALLATION PROCEDURES

8. Compressor Removal and Installation (Complete)

a. Removal

1. Remove Carburetor air cleaner.
2. Purge system as described in Note 44.
3. Remove screw securing plate retaining high and low pressure connectors to compressor rear head, and remove plate.
4. Remove high and low pressure connectors from rear head of compressor and cap connectors.
5. Cover compressor openings with Test Plate, J-9625, to prevent dirt from entering compressor.
6. Disconnect electrical connector from clutch coil terminals.
7. Disconnect superheat switch.
8. Loosen bolts securing power steering pump to mounting brackets, pivot pump toward engine, and remove drive belts from compressor.
9. Remove two screws, nut and washers securing compressor rear mounting bracket to engine.
10. Remove two screws securing compressor mounting flange to front mounting bracket.
11. Remove compressor by moving upward and rearward.

b. Installation

(NOTE: Before installing a replacement compressor, make certain the numeral 4 (5¼ on Fleetwood Seventy-Fives) is stamped 1/8 inch high on blank space provided in lower right hand corner of compressor name plate. If numeral is not evident, then stamp numeral as indicated. This numeral indicates the refrigerant capacity

and must be shown on all compressors as required by law in some states.)

1. Position compressor with rear mounting bracket aligned to engine, and loosely install two screws securing front mounting flange to front mounting bracket.
2. Loosely install two screws, nut and washers securing compressor rear mounting bracket to engine.
3. When compressor is properly positioned, tighten front mounting screws and then tighten screws and nut securing compressor to engine.
4. Install compressor drive belts on compressor and power steering pump and adjust belts as described in Section 6, Note 10.
5. Connect electrical connector to clutch coil terminals.
6. Connect superheat switch.
7. Remove Test Plate J-9527, and using new O-rings, position high and low pressure connectors to rear head and position retaining plate to connectors.

(NOTE: The O-rings in the compressor head should be oiled prior to placement in the cavity. Care should be taken not to damage these O-rings when installing the connectors.)

8. Install screw and washer securing retaining plate and pressure connectors to rear head of compressor.
9. Evacuate system as described in Note 44.
10. Charge system as described in Note 44. Leak test all compressor connections.

CAUTION: All leaks must be repaired. Under no circumstances should a compressor be operated when a leak exists, as complete loss of refrigerant prevents oil return to the compressor.

11. Install carburetor air cleaner.

9. Compressor Removal and Installation (Partial)

In order to perform certain engine operations it is necessary to move the compressor out of the way. This can be done without disconnecting any lines as follows:

a. Removal

1. Remove carburetor air cleaner.
2. Perform steps 6 through 10, Note 8a.
3. Move complete assembly clear of working area, being careful not to kink hoses. Use rope or wire to hold compressor out of way.

b. Installation

1. Perform Steps 1-6, Note 8b.
2. Install carburetor air cleaner.
3. Check system performance to assure no refrigerant was lost and system performs normally.

10. Condenser

a. Removal

1. Purge system as described in Note 44.
2. Remove two screws securing upper radiator mount bracket at each side of radiator cradle and remove two screws, one each side securing wheelhouse brace to bracket. Remove bracket.
3. Disconnect high pressure vapor line.
4. Remove clip securing liquid line to condenser frame.
5. Disconnect liquid line from condenser outlet pipe.
6. Remove four nuts, two each side, securing condenser mounting brackets to rubber mounts.
7. Remove four clips, two each side, that fasten acromat to condenser frame.
8. Remove condenser from chassis.

b. Installation

1. Add refrigeration oil as described in Note 44.
2. With top of condenser tipped backwards, lower condenser into position until lower mounting brackets will go under upper rubber mounts. Tip condenser vertically and lower until all four mounting brackets are resting on rubber cushions.
3. Secure mounting brackets to rubber mounts with four nuts, two each side.
4. Install four clips, two each side holding acromat to condenser frame.
5. Connect high pressure vapor line to condenser using a new O-ring.
6. Connect liquid line from receiver to condenser at outlet pipe using a new O-ring.
7. Install clip securing liquid line to condenser frame.
8. Install two upper radiator mount brackets and secure to cradle with two screws. Secure wheelhouse brace to bracket with one screw at each side.
9. Evacuate system as described in Note 44.
10. Charge system with refrigerant as described in Note 44 and leak test condenser connections.

11. Dehydrator-Receiver

The sight glass is an integral part of the dehydrator-receiver. No service should be performed on the sight glass.

a. Removal

1. Discharge system as described in Note 44.
2. Disconnect liquid line at COND side of sight glass. Cap liquid line if condenser is not being replaced.
3. Disconnect high pressure liquid line at EVAP side of sight glass and cap liquid line.

(NOTE: Cap fittings if original dehydrator-receiver is to be reinstalled.)

4. Remove dehydrator-receiver mounting bracket.
5. Remove dehydrator-receiver by tilting unit and lifting out.

b. Installation

CAUTION: Do not uncap new assembly, except to add refrigeration oil, until it is clamped in position, as it will quickly absorb moisture from the air, decreasing its efficiency or rendering it completely useless. Keep it capped at all times.

1. Install refrigeration oil, as described in Note 44 if new dehydrator-receiver is to be installed, and recap dehydrator-receiver.

2. Position dehydrator-receiver in mounting bracket, and secure with clamp.

(NOTE: Make certain dehydrator-receiver fittings are properly positioned before tightening mounting bolts.)

3. Remove caps from COND side of dehydrator-receiver and condenser pipe and install condenser to receiver liquid line, using new O-rings.

4. Remove caps from EVAP side of dehydrator-receiver and high pressure liquid line and install high pressure liquid line to EVAP fitting side of sight glass, using a new O-ring.

5. Evacuate system as described in Note 44.

6. Charge system with refrigerant as described in Note 44 and leak test dehydrator-receiver and condenser connections.

7. Check operation of system.

12. Programmer

a. Removal

1. Open glove compartment door and remove compartment liner as described in Section 12, Note 71a.

2. Remove two clips from vacuum valve studs and disconnect vacuum harness from programmer vacuum valve.

3. Disconnect electrical harness from programmer.

4. Disconnect door link from programmer output shaft.

5. Remove three screws securing programmer to heater case and remove programmer.

b. Installation

1. Position programmer to heater case - secure with three screws.

2. Connect electrical connector to programmer.

3. Connect vacuum harness to programmer vacuum valve. Secure harness with clips on pins of valve.

4. Install door link and adjust as described in Note 50b.

5. Install glove compartment liner as described in Section 12, Note 71b.

13. Evaporator Case

a. Removal

1. Discharge system as described in Note 44.

2. Remove electrical connections from ambient sensor, ambient switch, low refrigerant limiter and both blower relays. Remove blower ground wire.

3. Support front of hood and tape a pad to the right-hand rear corner.

4. Remove right-hand hood hinge. Note number and placement of shims.

5. Remove high pressure line from X-valve and position out of way.

6. Remove low pressure from P.O.A. valve and position out of way.

7. Remove right-hand tie strut at wheel house and position out of way.

8. Remove two nuts and four screws securing evaporator case to cowl.

9. Remove three screws holding evaporator case to air inlet and separate evaporator case from air inlet. Gasket must be cut apart at air inlet-to-evaporator case joint.

10. Remove vacuum hose from recirc. door actuator. Remove evaporator case and air inlet.

b. Installation

1. Position air inlet near cowl and connect vacuum hose to recirc. door actuator. Install sealer any place that gasket has separated.

2. Position evaporator case near cowl and secure to air inlet with three screws.

3. Secure evaporator case to cowl with four screws and two nuts.

4. Connect high pressure line to X-valve using a new O-ring.

5. Connect low pressure line to P.O.A. valve using a new O-ring.

6. Install right-hand tie strut to wheel house.

7. Install right-hand hood hinge.

(NOTE: Install shims as removed.)

8. Remove hood support and pad from corner of hood.

9. Make electrical connections to ambient sensor, ambient switch, low refrigerant limiter and blower relays. Install blower ground wire.

10. Evacuate and charge refrigeration system as described in Note 44 and leak test all connections.

14. Evaporator Core

a. Removal

1. Discharge system as described in Note 44.

2. Disconnect P.O.A. valve at evaporator end of valve.

3. Remove insulation from evaporator tube and remove two clips securing X-valve bulb. Position bulb out of way.

4. Disconnect oil bleed line from P.O.A. valve.

5. Disconnect expansion valve from evaporator.

6. Remove two brackets holding P.O.A. valve in position.

7. Remove right side tie strut at wheel house, position out of way.

8. Remove two nuts and four screws securing evaporator case to cowl.

9. Move evaporator case away from cowl and remove six screws holding halves of case together.

10. Remove case half and remove core from case. Case to cowl gasket must be cut where halves separate.

b. Installation

1. Install evaporator core in position in case. Install evaporator case half and secure with six screws.

2. Seal the junction where the case halves were split with sealer and move evaporator case into position on cowl.

3. Secure evaporator case to cowl with two nuts and four screws.
4. Install two P.O.A. valve brackets.
5. Using new O-rings, install lines to P.O.A. valve and expansion valve.
6. Position expansion valve bulb to evaporator pipe, secure with two clips and cover connection completely with insulation.
7. Position right-hand tie strut and secure with two nuts.
8. Evacuate and charge refrigeration system as described in Note 44 and leak test all connections.

15. POA Suction Throttling Valve

a. Removal

1. Discharge system as described in Note 44.
2. Disconnect low pressure vapor line from suction throttling valve and cap line.
3. Disconnect oil bleed line and external equalizer line from suction throttling valve.
4. Remove screw securing suction throttling valve clamp to brace on front of blower-evaporator assembly case.
5. Disconnect fitting on evaporator outlet pipe from POA suction throttling valve and remove valve.
6. Remove clamp from suction throttling valve.

b. Installation

1. Install clamp on suction throttling valve.
2. Connect suction throttling valve to fitting on evaporator outlet pipe, using a new O-ring.
3. Position suction throttling valve clamp to brace on front of blower-evaporator assembly case, and secure with screw.
4. Using new O-rings, connect equalizer and oil bleed lines to suction throttling valve.
5. Connect low pressure vapor line to suction throttling valve, using a new O-ring.
6. Evacuate system as described in Note 44.
7. Charge system as described in Note 44 and leak test all connections.
8. Check operation of system.

16. Expansion Valve

a. Removal

1. Discharge system as described in Note 44.
2. Remove insulation from power element bulb on evaporator outlet pipe and remove bulb clamp and bulb. Note routing of small tubes before removal.
3. Disconnect external equalizer line from POA suction throttling valve.
4. Disconnect high pressure liquid line from expansion valve and cap line.
5. Remove screw securing expansion valve clamp to brace on front of blower-evaporator assembly case.
6. Disconnect expansion valve from evaporator inlet pipe fitting and remove expansion valve.
7. Remove clamp from expansion valve.

b. Installation

1. Install clamp on expansion valve.
2. Using a new O-ring, connect expansion valve to evaporator inlet pipe fitting.
3. Install screw securing expansion valve clamp to brace on front of blower-evaporator assembly case.
4. Connect high pressure liquid line to expansion valve using a new O-ring.
5. Using a new O-ring, connect external equalizer line to suction throttling valve.
6. Attach power element bulb to evaporator outlet pipe and secure with clamp.

(NOTE: Use new clamp, if necessary, to obtain tight fit of bulb to tubing. Carefully route small tubes to clear water hoses.)

7. Carefully replace insulation around power element bulb, as insulation must be packed tightly around bulb.
8. Evacuate system as described in Note 44.
9. Charge system as described in Note 44 and leak test all connections.
10. Check operation of system.

17. Blower Motor

a. Removal

1. Disconnect negative battery cable.
2. Remove rubber cooling hose from nipple and blower motor.
3. Disconnect electrical connector at lead to motor.
4. Remove six screws securing blower to case and remove blower.

b. Installation

1. Install ground wire to blower flange screw at 5 o'clock position.
2. Secure capacitor to blower flange screw at 5 o'clock position.
3. Place a bead of sealer around opening where blower will contact case.
4. Guide blower motor against cowl and place on locating dowel.
5. Install five screws securing blower to case.
6. Connect electrical connector at lead to motor.
7. Install cooling hose on motor and nipple.

18. Heater Case

a. Removal

1. Drain radiator coolant.
2. Remove hoses from heater core nipples.
3. Remove instrument panel top cover as described in Section 12, Note 40a.
4. Remove right and left A/C outlet hoses and center outlet connector.
5. Remove two screws securing A/C distributor to heater case and remove distributor, Fig. 1-10.
6. Remove one screw securing defroster nozzle to heater case and remove nozzle from under clips and out of car, Fig. 1-12.
7. Remove glove compartment liner as described in Section 12, Note 71a.

8. Disconnect vacuum hoses at recirc door, water valve, control head and supply hose.
9. Disconnect aspirator hose from in-car sensor.
10. Remove instrument panel center vertical brace.
11. Remove instrument panel center horizontal brace.
12. Remove four nuts securing heater case to cowl on engine side of cowl, Fig. 1-9.
13. Remove heater case from position under instrument panel being careful to hold case as upright as possible to avoid spilling coolant from heater core nipples on carpet.

b. Installation

1. Position heater case under instrument panel as shown in Fig. 1-9. Do not position to cowl.
2. Install heater case in position on cowl, Fig. 1-9, and secure with four nuts on engine side of cowl.
3. Install heater hoses to heater core nipples and replace coolant.
4. Connect vacuum hose at recirc door, water valve, control head and supply. Color codes are shown in Fig. 1-54.
5. Install instrument panel center vertical brace.
6. Install instrument panel center horizontal brace.
7. Install defroster nozzle as shown in Fig. 1-12 under clips and secure with one screw to heater case.
8. Install A/C distributor under clip on heater case and secure with two screws.
9. Install rubber connector between center A/C distributor and center A/C outlet.
10. Install left and right outlet hoses, Fig. 1-10.
11. Install instrument panel top cover as described in Section 12, Note 40b.
12. Connect aspirator hose to in-car sensor and make vacuum and electrical connections to programmer, working through glove compartment opening.
13. Install glove compartment liner as described in Section 12, Note 71b.

19. Heater Core

a. Removal

1. Remove heater case as described in Note 18.
2. Remove rubber seal from around core water nipples.
3. Remove screw and clip from beneath seal.
4. Remove two screws and clip from opposite end of core and remove core from position in case.

b. Installation

1. Locate heater core in position in heater case.
2. Secure bottom of core with clip and two screws.
3. Secure top of core with clip and screw.
4. Install rubber seal over water nipples.
5. Install heater case as described in Note 18.

20. Water Control Valve

(NOTE: The thermal vacuum valve is installed on 6F rear units only and is serviced with the water control valve as an assembly.)

a. Removal (Fig. 1-26)

1. Clamp off valve inlet and outlet water hoses.
2. Remove vacuum hose from water control valve.
3. On 6F rear units, remove vacuum hoses from thermal vacuum valve.
4. Remove clamps securing hoses to valve, and remove valve from hoses.

b. Installation

1. Install water valve on inlet and outlet hoses and install clamps.
2. Remove clamps from hoses.
3. On all but 6F rear units, install white vacuum hose at water control valve.
4. On 6F rear units, install red vacuum hose at water control valve. Install yellow and purple vacuum hoses on thermal vacuum valve so yellow hose connects to vacuum nipple closest to water outlet fitting.
5. Replace any coolant lost.

21. Air Conditioning Outlets

The procedures for removing and installing the outlets are described in Section 12, Note 66.

22. In-Car Sensor

The procedure for removing and installing the in–car sensor is described in Section 12, Note 65.

23. Automatic Climate Control Air Conditioner Control Panel

The procedure for removing and installing the control panel is described in Section 12, Note 64.

24. Air Conditioning Control Panel Disassembly and Assembly

The control panel must be removed as described in Section 12, Note 64 to perform any of the following procedures.

a. Circuit Board Removal

1. Remove one screw securing wire harness clip to control head base plate.
2. Remove two green wires from temperature dial rheostat.
3. Remove three screws on bottom of base plate securing circuit board to base plate.
4. Move control lever to "OFF" position and remove circuit board by sliding out from under control lever.

b. Circuit Board Installation

1. Move control lever to DEF position and feed circuit board connector and wires through base plate from bottom.

CAUTION: This procedure is important to avoid damage to the wiper contacts on bottom of control lever.

2. Work circuit board into position and secure to base plate with three screws.
3. Working on top side of control head, connect two green wires to temperature dial rheostat, Fig. 1-20.
4. Secure harness clip to base plate with one screw, Fig. 1-20.

c. Temperature Dial Rheostat Removal

1. Disconnect two green leads from rheostat terminals.
2. Remove two screws securing rheostat bracket to mounting plate and remove rheostat.

d. Temperature Dial Rheostat Installation

1. Position rheostat to control panel and install two screws securing rheostat bracket to mounting plate.
2. Connect two green wires to rheostat terminal.
3. After installing control panel on car, adjust temperature dial as indicated in Note 48.

e. Control Head Vacuum Valve Removal

1. Loosen two screws securing control vacuum valve to control head and remove valve.

f. Control Vacuum Valve Installation

1. Position control vacuum valve on control head so that pin engages lever arm.
2. Secure with two screws.

25. Superheat Switch

a. Removal

1. Completely discharge air conditioning system as described in Note 44.
2. Remove carburetor air cleaner and remove wire from superheat switch.
3. Loosen one screw securing plate retaining high and low pressure connectors to compressor rear head. Remove plate and connectors.
4. Loosen power steering pump to relieve tension on compressor pulley.
5. Remove four screws and one nut securing compressor to engine and prop-up rear of compressor.
6. Remove superheat switch retainer ring using snap ring pliers, J-5403.
7. Remove superheat switch from rear head by pulling at terminal housing groove with a pair of pliers.
8. Remove "O" ring from switch cavity in rear head. Use Oil Pick-Up Tube Remover, J-5139, or a wire with a hook on the end.
9. Recheck superheat switch for closed contacts. See superheat switch check in diagnosis section on page 1-14. Replace as necessary.

b. Installation

1. Check cavity and "O" ring groove in rear head for dirt or foreign material and be sure area is clean before installing "O" ring. Lubricate "O" ring liberally with 525 viscosity oil, and install in groove of cavity in rear head.
2. Lubricate housing of superheat switch with 525 viscosity oil and insert switch carefully into switch cavity until switch bottoms.
3. Using Snap Ring Pliers, J-5403, install superheat switch retainer ring with high point of the curved sides next to the switch housing, Fig. 1-15. Be sure the retainer ring is properly seated in the snap ring groove.
4. Check for electrical continuity between switch housing and rear head. Also check for continuity between terminal and switch housing to be sure the contacts are open.
5. Return compressor to position on engine and secure with four screws and one nut.
6. Adjust compressor belt tension as described in Section 6, Note 10.
7. Position high and low pressure connectors to rear head and secure with plate and screw.
8. Connect wire to superheat switch and install carburetor air cleaner.
9. Evacuate and recharge system with refrigerant, according to the following special charging procedure.

CAUTION: To prevent the possibility of "blowing" the thermal fuse during charging of the system, disconnect the superheat switch at the connector on right side of compressor near valve cover.

a. Evacuate, recharge and leak check entire A/C system according to procedure described in Note 44. Repair any leaks, check and add oil as required for proper operation of system.

b. When system is operating normally, reconnect plug to thermal fuse.

COMPRESSOR OVERHAUL

26. Compressor Service

When servicing the compressor, remove only the necessary components that preliminary diagnosis indicates are in need of service. Refer to Fig. 1-83 for information relative to parts nomenclature and location.

Some service operations can be performed without disturbing the internal mechanism assembly or completely removing the compressor from the car. Among them are replacement of the clutch plate and hub assembly, the pulley and bearing assembly, and pulley bearing.

The clutch coil and housing assembly also may be replaced without completely removing the compressor, after clutch and pulley parts have been removed. It is not necessary to disturb the shaft seal.

The shaft seal assembly can be replaced only by removing the compressor from the car and removing the clutch plate and hub assembly to gain access to the seal. A complete kit of shaft seal parts is available for field replacement.

Removal and installation of external compressor components and disassembly and assembly of internal components must be performed on a clean workbench. The work area, tools, and parts must be kept clean at all times. Parts Tray, J-9402, should be used for all parts being removed as well as for replacement parts.

Although certain service operations can be performed without completely removing the compressor from the car, the operations described herein are based on bench overhaul with the compressor removed from the car. They have been prepared in sequence in order of accessibility of the components.

When a compressor is removed from the car for servicing, the amount of oil remaining in the compressor should be drained and measured. This oil should then be discarded and new oil added to the compressor as described in Note 44.

27. Compressor Clutch Plate and Hub Assembly

a. Removal

1. Place Holding Fixture, J-9396, in a vise, and secure compressor to fixture with pulley end up.
2. Keep clutch hub from turning with Clutch Hub Holding Tool, J-9403, and remove locknut from end of shaft using Thin Wall Socket, J-9399, Fig. 1-56.
3. Thread Clutch Plate and Hub Assembly remover, J-9401, into hub. Hold body of tool with a wrench and tighten center screw to remove clutch plate and hub assembly, Fig. 1-57.
4. Remove square drive key from shaft.
5. Remove hub retainer ring using Snap Ring Pliers, J-5403 (#21), and then remove hub spacer, Fig. 1-58.

b. Installation

1. Install square drive key on shaft, allowing it to project approximately 3/16 inch out of keyway.
2. Wipe frictional surface of clutch plate and pulley clean.

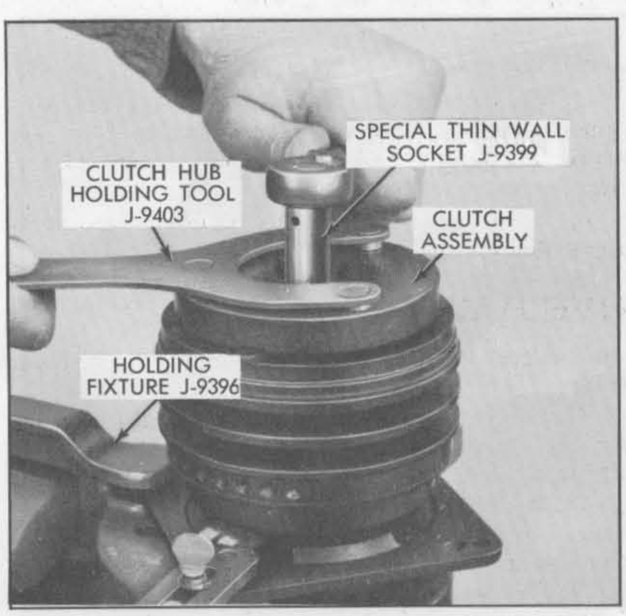


Fig. 1-56 Removing Locknut

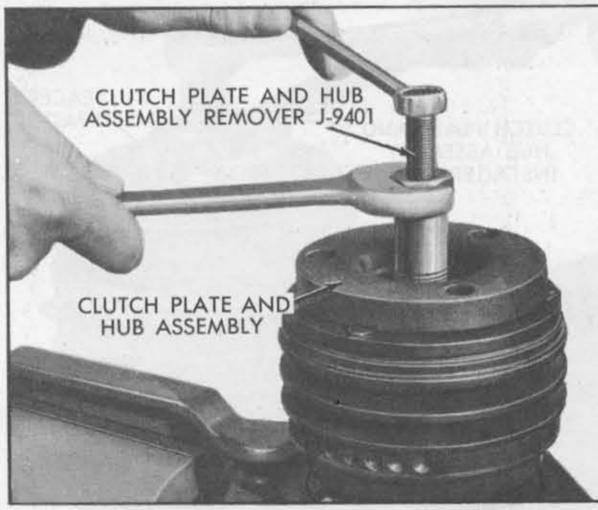


Fig. 1-57 Removing Clutch Plate and Hub Assembly

3. Place clutch plate and hub assembly on shaft, aligning shaft key with keyway in hub.

CAUTION: To avoid internal damage to compressor, do not drive or pound on hub or shaft. This could mis-position axial plate on shaft, resulting in damage to compressor.

4. Place Spacer, J-9480-2, on hub, Fig. 1-83. Insert end of Clutch Plate and Hub Assembly Installer, J-9480-1, through spacer and thread tool onto end of shaft.
5. Hold hex portion of tool body with a wrench and tighten center screw several turns to press hub partially on shaft, Fig. 1-59.
6. Remove Clutch Plate and Hub Assembly Installer and Spacer. Check alignment of drive key with keyway in shaft. If alignment is correct, replace installer tools and continue to press hub onto shaft until there is approximately a 3/32 inch (.093 inch) air gap between frictional surfaces of pulley and clutch plate.

(NOTE: A zero thrust race is 3/32 inch thick and can be used as a gage between these frictional surfaces.)

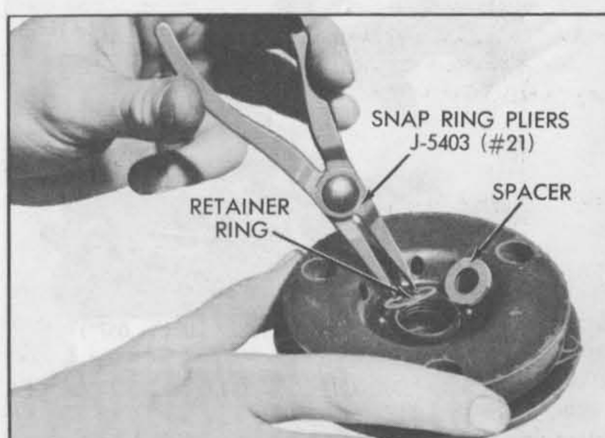


Fig. 1-58 Removing Hub Retainer Ring and Spacer

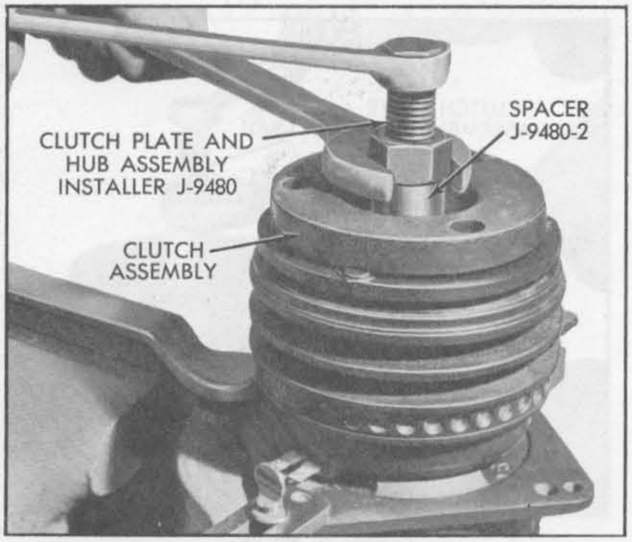


Fig. 1-59 Installing Clutch Plate and Hub Assembly

7. Remove Installer, J-9480, and Spacer, J-9480-2.
8. Install hub spacer.
9. Using Snap Ring Pliers, J-5403 (#21), install hub retainer ring with flat side of ring facing spacer.

10. Install a new shaft locknut with small diameter boss of nut against hub spacer, using special Thin Wall Socket J-9399, Fig. 1-56. Hold clutch hub with Clutch Hub Holding Tool, J-9403, and tighten nut to 15 foot-pounds torque, using a 0-25 foot pounds torque wrench. Air gap between frictional surfaces of pulley and clutch plate should now be approximately 1/32 inch (.031 inch to .057 inch), Fig. 1-60.

28. Compressor Pulley and Bearing Assembly

a. Removal

1. Remove clutch plate and hub assembly as described in Note 27a.

2. Remove pulley retainer ring using Snap Ring Pliers, J-6435 (#26), Fig. 1-61.

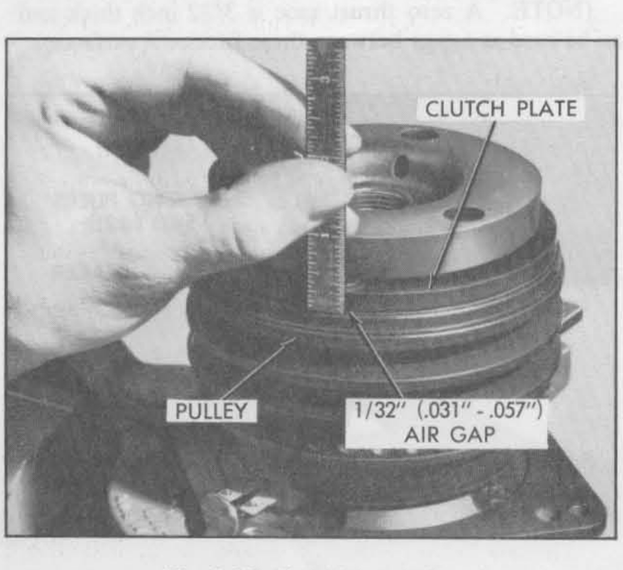


Fig. 1-60 Checking Air Gap

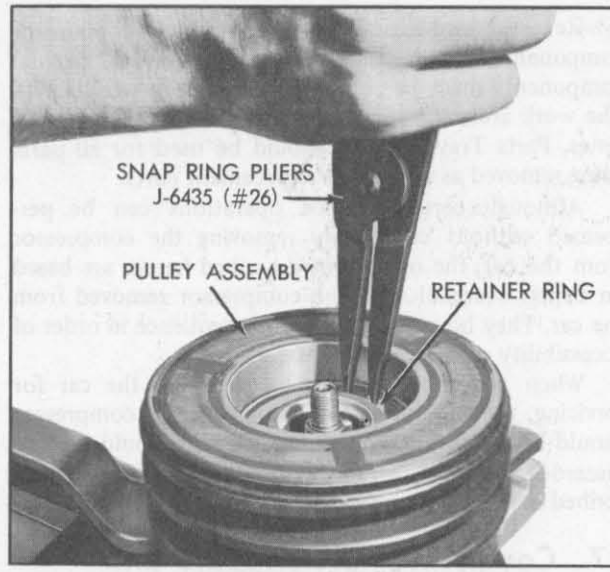


Fig. 1-61 Removing Pulley Retainer Ring

3. Pry out absorbent sleeve retainer, and remove absorbent sleeve from compressor neck.

4. Place Puller Pilot, J-9395, over end of compressor shaft.

CAUTION: It is important that Puller Pilot, J-9395, be used to prevent internal damage to compressor when removing pulley. Under no circumstances should Puller be used directly against drilled end of shaft.

5. Remove pulley and bearing assembly using Pulley Puller, J-8433, Fig. 1-62.

b. Installation

1. If original pulley and bearing assembly is to be reinstalled, wipe frictional surface of pulley clean. If

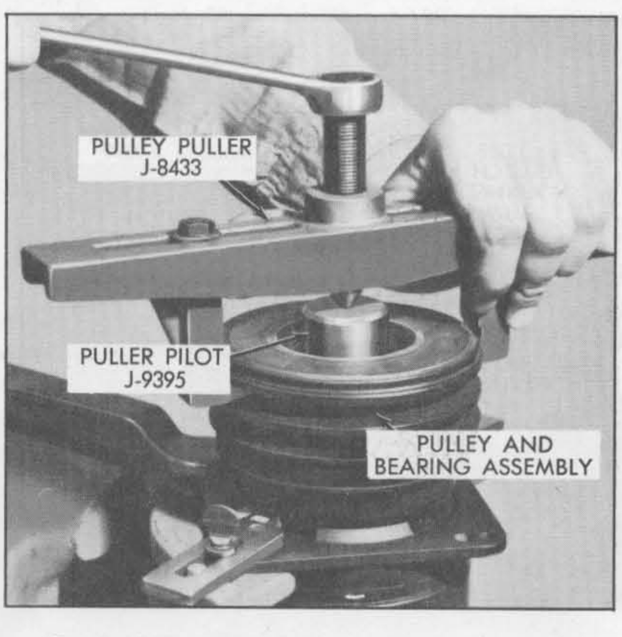


Fig. 1-62 Removing Pulley and Bearing Assembly

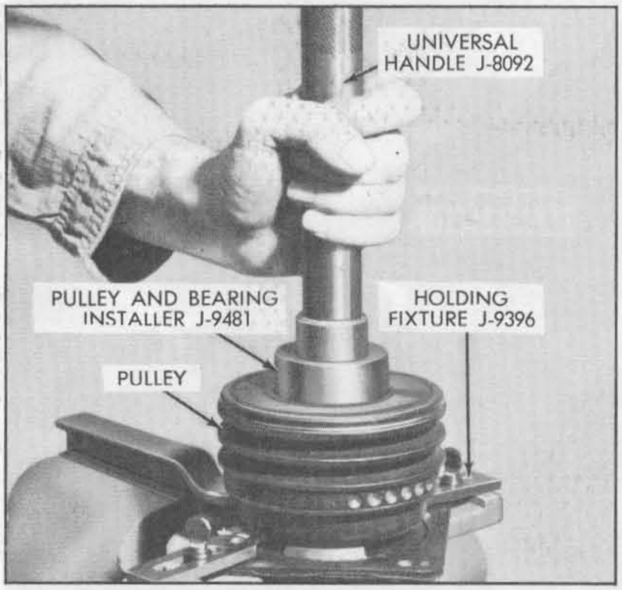


Fig. 1-63 Installing Pulley and Bearing Assembly

frictional surface of pulley shows any indication of damage due to overheating, pulley should be replaced.

2. Check bearing for brinelling, excessive looseness, noise, and lubricant leakage. If any of these conditions exist, bearing should be replaced. The procedure for replacing bearing is described in Note 29.

3. Press or tap pulley and bearing assembly on neck of compressor until it seats, using Pulley and Bearing Installer, J-9481, with Universal Handle, J-8092, Fig. 1-63. Installer will apply force to inner race of bearing and prevent damage to bearing.

4. Check pulley for binding or roughness. Pulley should rotate freely.

5. Install retainer ring using Snap Ring Pliers, J-6435 (#26).

6. Install absorbent sleeve in compressor neck.

7. Install absorbent sleeve retainer in neck of compressor. Using sleeve from Seal Seat Remover J-9393,

Fig. 1-64 Removing Pulley and Bearing Retainer Ring

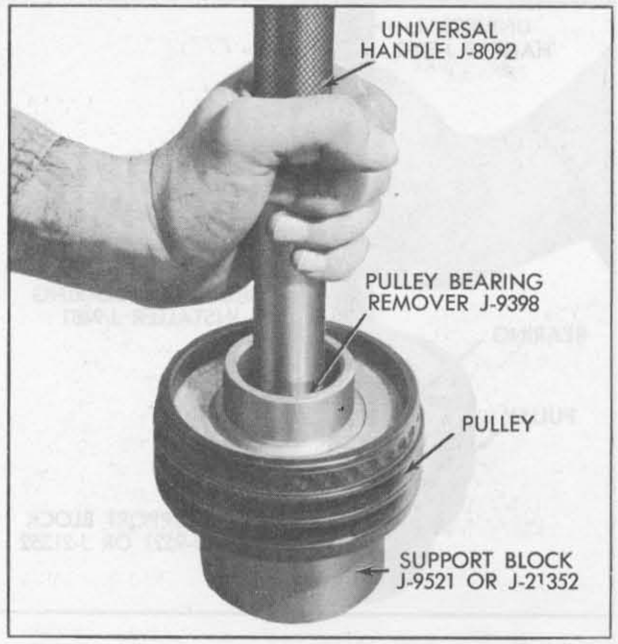


Fig. 1-65 Removing Bearing From Pulley

install retainer so that outer edge is recessed 1/32" from compressor neck face.

8. Install clutch plate and hub assembly as described in Note 27b.

29. Compressor Pulley Bearing Replacement

1. Remove clutch plate and hub assembly as described in Note 27a.

2. Remove pulley and bearing assembly as described in Note 28a.

3. Remove pulley bearing retainer ring with a small screwdriver or pointed tool, Fig. 1-64.

4. Place pulley and bearing assembly on inverted Support Block, J-9521, and, using Pulley Bearing Remover, J-9398, with Universal Handle, J-8092, drive bearing assembly out of pulley, Fig. 1-65.

5. Install new bearing in pulley using Pulley and Bearing Installer J-9481 with Universal Handle, J-8092, Fig. 1-66. The tool will apply the force to the outer race of the bearing.

CAUTION: Do not clean new bearing assembly with any type of solvent. Bearing is supplied with correct lubricant when assembled and requires no other lubricant at any time.

6. Install bearing retainer ring, make certain that it is properly seated in ring groove.

7. Install pulley and bearing assembly as described in Note 28b.

8. Install clutch plate and hub assembly as described in Note 27b.

30. Compressor Clutch Coil and Housing Assembly

The coil has 3.85 ohms resistance at 80°F (ambient temperature) and should draw 3.2 amps at 12 volts.

Fig. 1-66 Installing Bearing on Pulley

a. Removal

1. Remove clutch plate and hub assembly as described in Note 27a.

2. Remove pulley and bearing assembly as described in Note 28a.

3. Note position of terminals on coil housing and scribe location on compressor front head casting.

4. Remove coil housing retaining ring using Snap Ring Pliers, J-6435 (#26), Fig. 1-67.

5. Lift coil and housing assembly off compressor.

b. Installation

1. Position coil and housing assembly on compressor front head casting so electrical terminals line up with marks previously scribed on compressor.

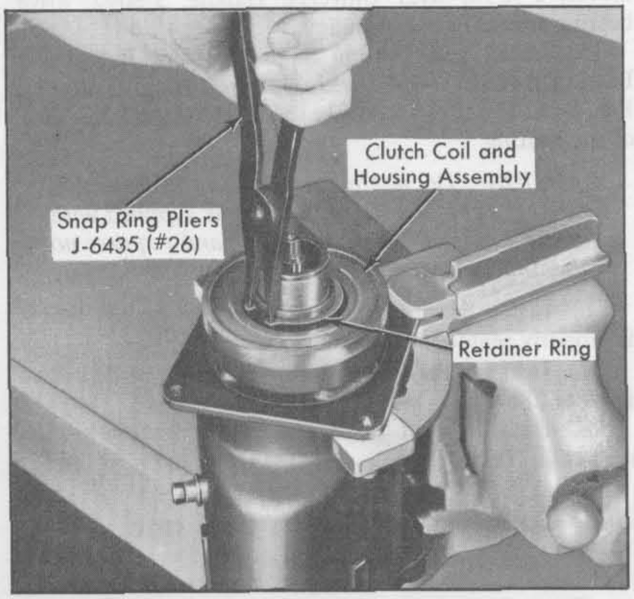


Fig. 1-67 Removing Coil Housing Retainer Ring

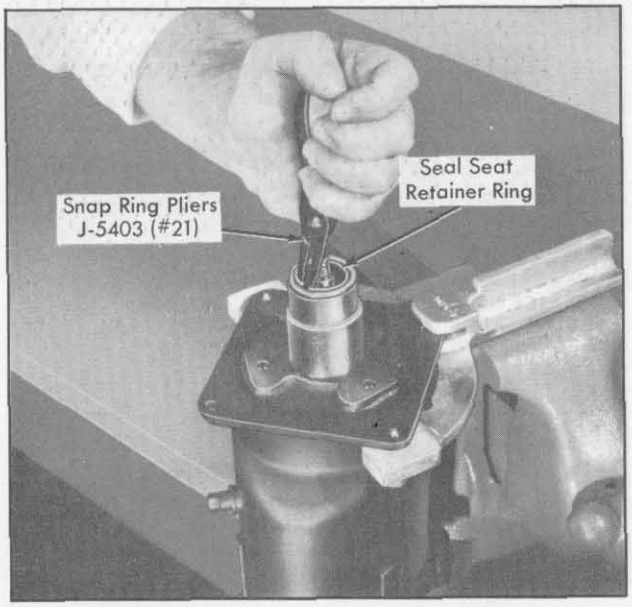


Fig. 1-68 Removing Seal Seat Retainer Ring

2. Align locating extrusions on coil housing with holes in front head casting.

3. Install coil housing retainer ring, with flat side of ring facing coil, using Snap Ring Pliers, J-6435 (#26).

4. Install pulley and bearing assembly as described in Note 28b.

5. Install clutch plate and hub assembly as described in Note 27b.

31. Compressor Shaft Seal Assembly

a. Removal

1. Remove clutch plate and hub assembly as described in Note 27a.

2. Pry out sleeve retainer and remove sleeve.

3. Remove seal seat retainer ring using Snap Ring Pliers, J-5403 (#21), Fig. 1-68.

(NOTE: Illustration shows coil and housing removed. However, this is not necessary.)

4. Thoroughly clean inside of the compressor neck area surrounding the shaft, exposed portion of.seal seat, and the shaft itself of any dirt or foreign material.

5. Remove seal seat using Seal Seat Remover and Installer, J-23128, Fig. 1-69. Adjust tool to grasp the

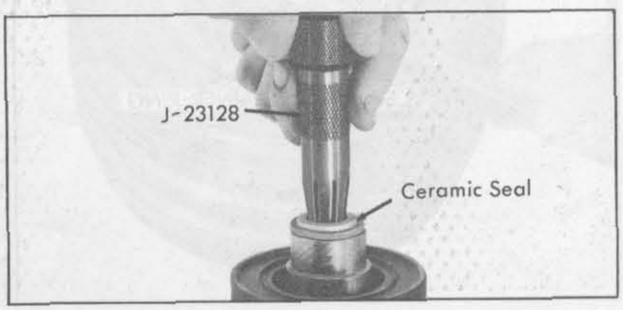


Fig. 1-69 Removing Seal Seat

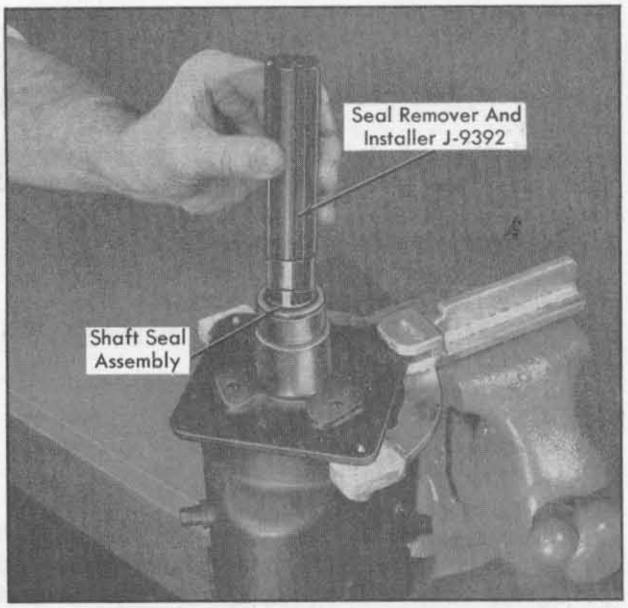


Fig. 1-70 Removing Shaft Seal Assembly

flange of the seal seat securely and remove with a twist-pull motion.

6. Remove shaft seal assembly using Seal Remover and Installer, J-9392, Fig. 1-70. Press down on tool to overcome seal spring pressure and twist tool clockwise to engage tabs on seal assembly with locking tangs on tool. Remove seal assembly by pulling straight out from shaft.

7. Remove seal seat O-ring from compressor neck. A wire with a hook formed on the end may be used, Fig. 1-71.

8. Re-check the shaft and inside of compressor neck for dirt or foreign material and be sure those areas are perfectly clean before installing new parts.

b. Installation

1. Coat new seal seat O-ring with clean refrigeration oil and install in compressor neck, making certain it is installed in bottom groove, Fig. 1-72. Top groove is for retainer ring.

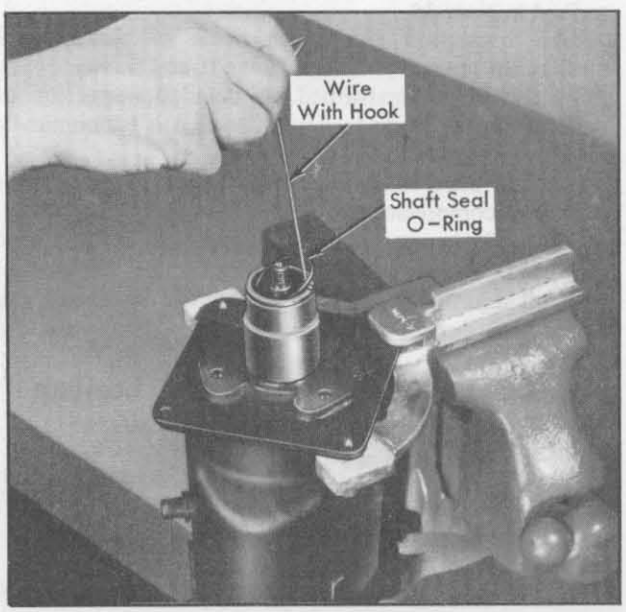


Fig. 1-71 Removing Shaft Seal O-Ring

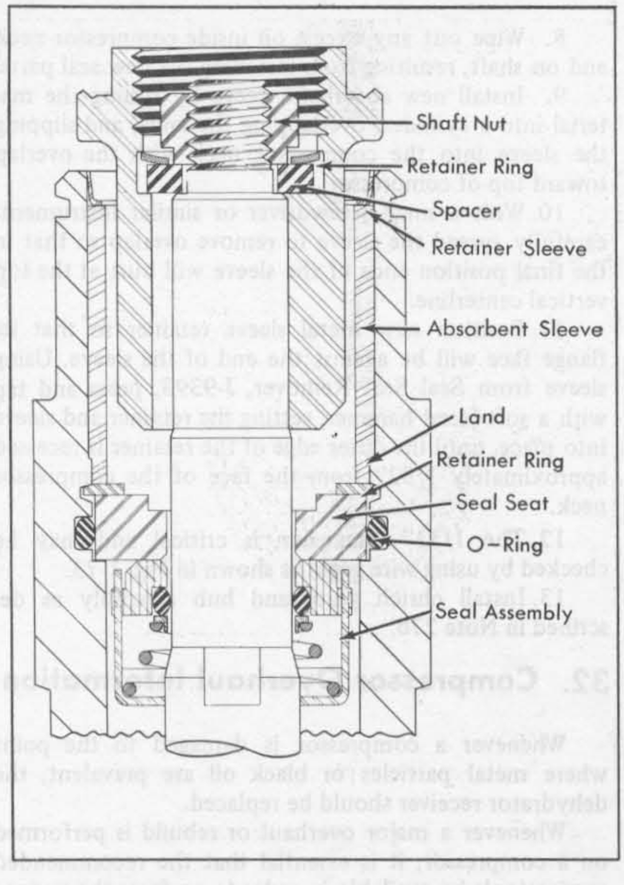


Fig. 1-72 Shaft Seal and Seat Installed

2. Coat O-ring and seal face of new seal assembly with clean refrigeration oil.

3. Carefully engage tabs on new seal assembly with tangs of Seal Remover and Installer, J-9392 and install new seal assembly over flats on shaft. Turn tool counter-clockwise to release it from seal tabs and remove tool.

4. If ceramic seat is being installed, coat seal face of new seal seat with clean refrigeration oil and install new seal seat, using Seal Seat Remover and Installer, J-23128. The seal seat is installed with the tool by a twist-push motion until the seat bottoms on the compressor shaft.

5. If carbon seat is being installed, coat seal face of new seal seat with clean refrigeration oil and install new seal seat, using Seal Seat Remover and Installer, J-9393. With either type seat, make sure seal seat O-ring is not dislodged and seal seat is making a good seal with the O-ring.

CAUTION: Seal faces of seal assembly and seal seat must be protected against dirt or any damage, such as scratches and nicks. Even finger markings are to be avoided.

6. Install new seal seat retainer ring, with flat face against the seal seat, using Snap Ring Pliers, J-5403 (#21). Sleeve from Seal Seat Remover and Installer, J-9393, may be used to press on the retainer ring so that it snaps into its groove, Fig. 1-72.

7. Leak test compressor as described in Note 45. Correct any leaks found.

8. Wipe out any excess oil inside compressor neck and on shaft, resulting from installing the new seal parts.

9. Install new absorbent sleeve by rolling the material into a cylinder, overlapping the ends, and slipping the sleeve into the compressor neck with the overlap toward top of compressor.

10. With a small screwdriver or similar instrument, carefully spread the sleeve to remove overlap so that in the final position ends of the sleeve will butt at the top vertical centerline.

11. Position new metal sleeve retainer so that its flange face will be against the end of the sleeve. Using sleeve from Seal Seat Remover, J-9393, press and tap with a soft-faced hammer, setting the retainer and sleeve into place, until the outer edge of the retainer is recessed approximately 1/32" from the face of the compressor neck.

12. The 1/32" dimension is critical and may be checked by using wire gages as shown in Fig. 1-73.

13. Install clutch plate and hub assembly as described in Note 27b.

32. Compressor Overhaul Information

Whenever a compressor is damaged to the point where metal particles or black oil are prevalent, the dehydrator receiver should be replaced.

Whenever a major overhaul or rebuild is performed on a compressor, it is essential that the recommended service tools be available in order to perform the various service operations properly. In addition, an adequate supply of service parts should be available. Service parts should include the following.

1. Standard size piston drive balls.
2. Shoe discs - total of 11 sizes, including the ZERO shoe.
3. Thrust races - total of 16 sizes, including the ZERO race.
4. Pistons.

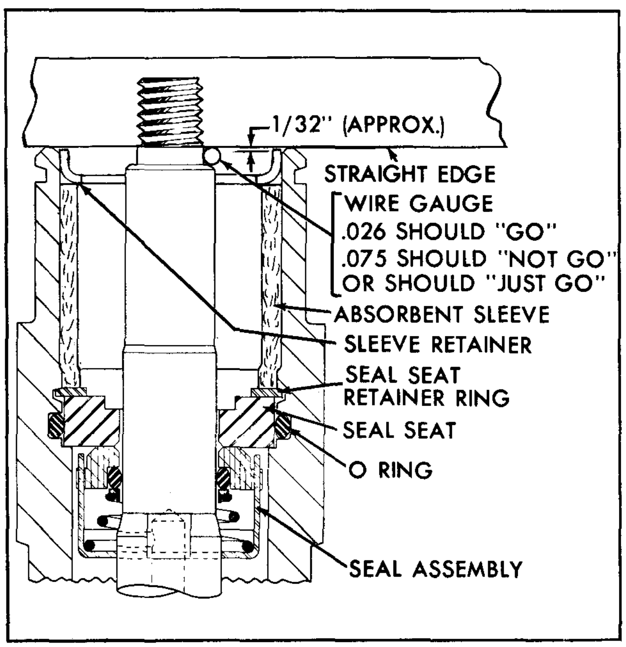


Fig. 1-73 Gaging Seal Retainer

5. Main shaft needle bearings.
6. Thrust bearings.
7. Compressor shaft, axial plate and woodruff key assembly.
8. Service cylinder assembly - front, rear halves, with main bearing in place and halves dowel pinned together.
9. Major internal mechanism assembly.
10. Suction reed valve - front, rear.
11. Discharge valve assembly - front, rear.
12. Gasket service kit - containing all gaskets, seals, O-rings, etc.
13. Shaft seal kit.
14. Nuts - head to shell and shaft.
15. Retainer rings.
16. Cylinder locator pins.
17. Valve and head locator pins.
18. Service type discharge cross-over tube kit. All service parts are protected by a preservation process and packaged in a manner that will eliminate the necessity of cleaning, washing or flushing of parts to remove preservation materials. Parts can be used just as they are removed from service package.

Certain parts are identified on the piece part to denote their size or dimension. This applies to piston shoe discs and shaft thrust races.

Gasket service kit contains shaft seal O-ring, head to shell O-rings, oil tube inlet O-ring, and discharge cross-over tube O-ring. This kit should be used to replace all seals and gaskets whenever a compressor is overhauled or an individual component is replaced.

There is an optional method of handling one of the major internal components -- the cylinder assembly. A service cylinder assembly, including bearings, and both front and rear halves of cylinders mated together, is available for service.

There may be occasions where it would be desirable to use this assembly rather than the complete internal assembly. In case it is used, the gaging and parts selection operations will have to be performed as described in Note 35.

An inspection should be made of the internal mechanism assembly to determine if any service operations should be performed. A detailed inspection of parts should be made to determine if it is economically feasible to replace them.

Before proceeding with disassembly, wipe exterior surface of compressor clean.

All oil in compressor should be drained and measured. Assist draining by positioning compressor with oil drain plug down, open suction connector and rotate drive shaft several times.

33. Compressor Internal Mechanism Removal

1. Remove clutch plate and hub assembly as described in Note 27a.
2. Remove pulley and bearing assembly as described in Note 28a.
3. Remove clutch coil and housing assembly as described in Note 30a.
4. Remove shaft seal as described in Note 31a.

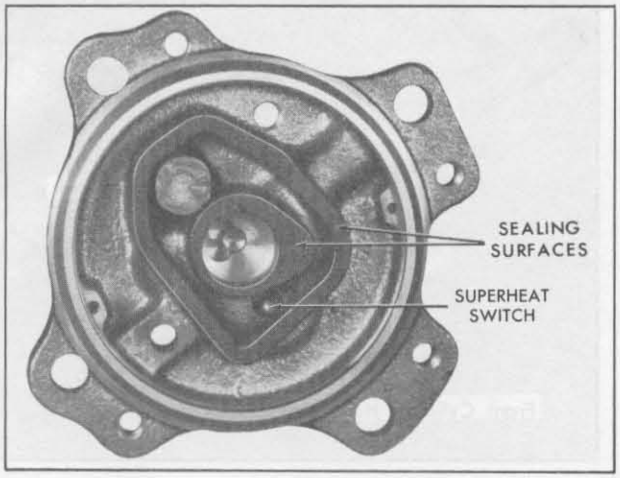


Fig. 1-74 Sealing Surfaces on Rear Head

5. Invert compressor and Holding Fixture, J-9396, with front end of compressor shaft down.

(NOTE: Additional oil may leak from compressor at this time. All oil must be drained into a container so that total amount can be measured. A liquid measuring cup may be used for this purpose. Drained oil should then be discarded.)

6. Remove four locknuts from threaded studs on compressor shell and remove rear head.

(NOTE: Tap uniformly around rear head if head is binding.)

7. Wipe excess oil from all sealing surfaces on rear head casting webs, and examine sealing surfaces, Fig. 1-74. If any damage is observed, head should be replaced.

8. Remove suction screen and examine for any damage or contamination. Clean or replace if necessary.

9. Paint an identifying mark (prussian blue or other suitable marking material may be used) on exposed face of inner and outer oil pump gears and then remove gears.

(NOTE: Identifying marks are to assure that gears, if reused, will be installed on identical position.)

10. Remove and discard rear head to shell O-ring.

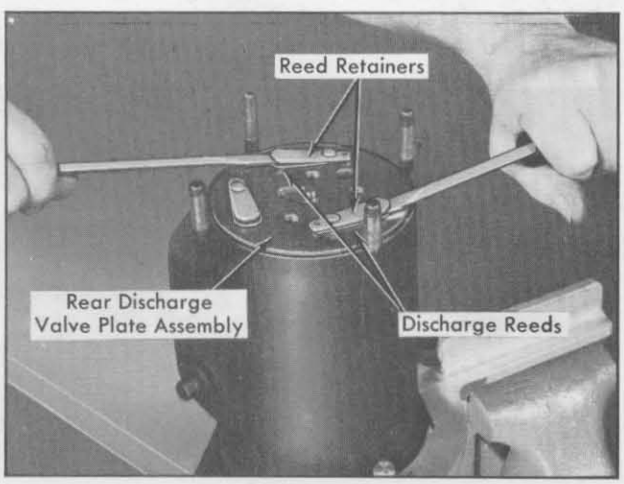


Fig. 1-75 Removing Rear Discharge Valve Parts

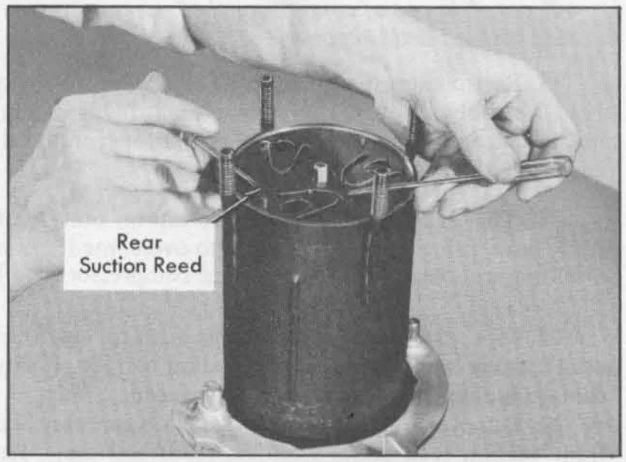


Fig. 1-76 Removing Rear Suction Reed

11. Carefully remove rear discharge valve plate assembly. Use two small screwdrivers under reed retainers and pry up on assembly, Fig. 1-75. Do not position screwdrivers between reeds and reed seats.

12. Examine valve reeds and seats. Replace entire assembly if any reeds or seats are damaged.

13. Using two small screwdrivers, carefully remove rear suction reed, Fig. 1-76. Do not pry up on horseshoe shaped reed valves.

14. Examine reeds for damage, and replace if necessary.

15. Using Oil Pick-Up Tube Remover, J-5139, Fig. 1-77 remove oil pick-up tube. Remove O-ring from oil inlet.

16. Loosen compressor from Holding Fixture, place Internal Assembly Support Block, J-9521, over oil pump shaft and, holding Support Block in position with one hand, lift compressor from Holding Fixture with other hand. Invert compressor and position on bench with Internal Assembly Support Block resting on bench.

17. Lift front head and compressor shell assembly up, leaving internal mechanism resting on Internal Assembly Support Block.

CAUTION: Do not tap on end of compressor shaft to remove internal mechanism. If mechanism

Fig. 1-77 Removing Oil Pick-Up Tube

will not slide out of compressor shell, tap on front head with a plastic hammer.

18. Rest compressor shell on its side and push front head assembly through compressor shell, being careful not to damage sealing areas on inner side of front head. Discard O-ring.

(NOTE: It may be necessary to tap on outside of front head, using a plastic hammer, to overcome friction of O-ring seal between front head and compressor shell.)

19. Wipe excess oil from sealing surfaces on front head casting webs and examine sealing surface. If any damage is observed, head should be replaced.

20. Remove front discharge valve plate assembly and front suction reed plate. Examine reeds and seats. Replace necessary parts.

21. Remove suction cross-over cover by prying with screwdriver between cylinder casting and cover.

(NOTE: Examine internal mechanism for any obvious damage. If internal mechanism has sustained major damage, due to loss of refrigerant or oil, it may be necessary to use the service internal mechanism assembly rather than replace individual parts.)

34. Compressor Internal Mechanism Disassembly

Use Parts Tray, J-9402, to retain compressor parts during disassembly.

1. Remove internal mechanism from compressor as described in Note 33.

2. Identify by pencil mark, or some other suitable means, each piston numbering them 1, 2, and 3. Fig. 1-78. Number the piston bores in the front cylinder half in like manner so that pistons can be replaced in their original locations.

3. Separate cylinder halves, using a wood block and mallet, Fig. 1-79. Make certain that discharge cross-over tube does not contact axial plate when separating cylinder halves.

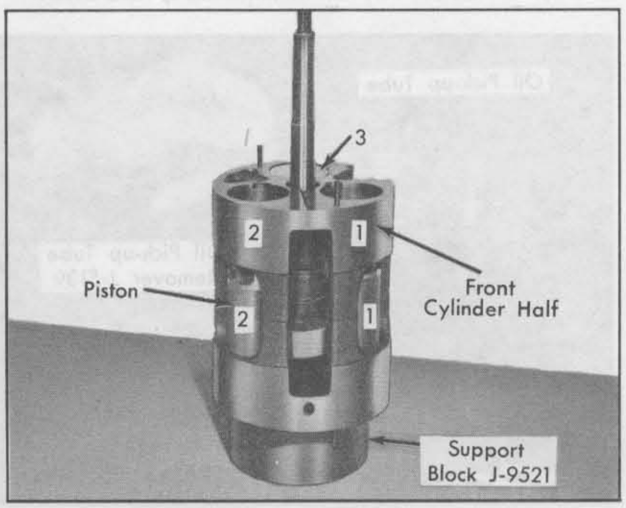


Fig. 1-78 Numbering Piston and Cylinder Bores

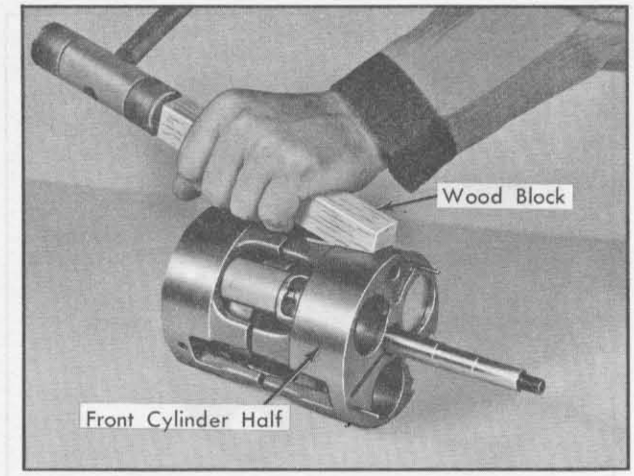


Fig. 1-79 Separating Cylinder Halfs

CAUTION: Under no circumstances should shaft be struck at either end in an effort to separate upper and lower cylinder halves.

4. Position complete internal mechanism, rear cylinder down, on Support Block, J-9521, and remove front cylinder half.

5. Pull up on compressor shaft and remove piston previously identified as #1, with balls and shoe discs, from axial plate.

6. Remove and discard piston shoe discs.

7. Remove and examine piston balls, and if satisfactory for re-use, place balls in #1 compartment of Parts Tray.

8. Remove piston rings and examine for re-use. If satisfactory, place in proper slots below #1 piston in Parts Tray.

9. Place piston in #1 compartment of Parts Tray with notch in casting web at front end of piston in dimpled groove of compartment, Fig. 1-80.

10. Repeat steps 5 through 9 for pistons #2 and #3.

11. Remove front combination of thrust races and thrust bearing from shaft, Fig. 1-81. Discard races and place bearing in front bearing slot of Parts Tray.

12. Remove shaft assembly from rear cylinder half. It may be necessary to bend discharge cross-over tube slightly in order to remove shaft.

13. Remove rear combination of thrust races and

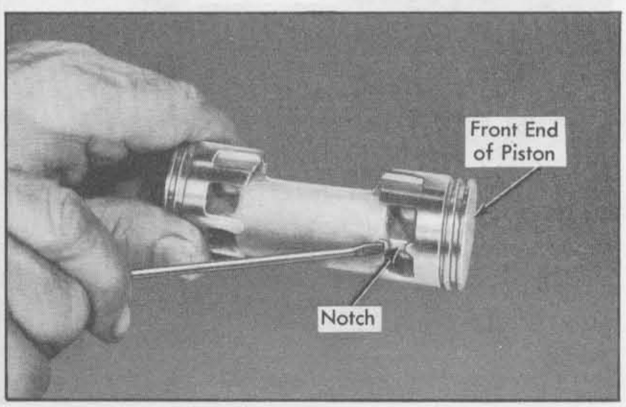


Fig. 1-80 Compressor Piston

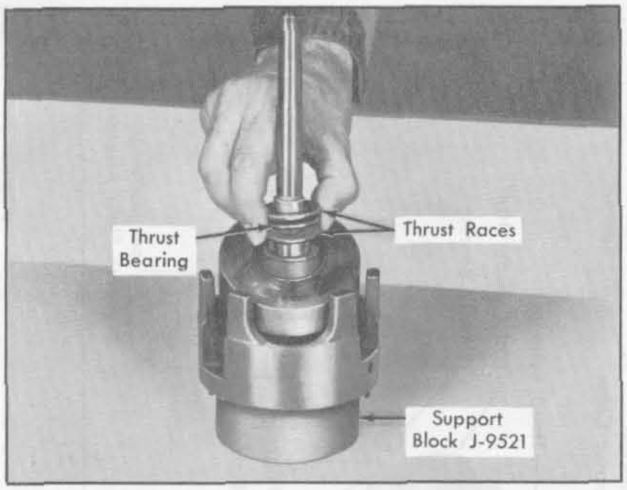


Fig. 1-81 Removing Front Thrust Races and Bearing

bearing from shaft. Discard races and place bearing in rear bearing slot in Parts Tray.

14. Examine surface of axial plate and shaft. Replace as an assembly, if necessary. Examine front and rear thrust bearings and replace if necessary.

(NOTE: A certain amount of shoe disc wear on axial plate is normal as well as some markings indicating load of needle bearings on shaft.)

15. Remove discharge cross-over tube from cylinder half, using self clamping pliers.

(NOTE: This is necessary only on original factory equipment as ends of the tube are swedged into cylinder halves. The discharge cross-over tube in internal mechanism assemblies that have been previously serviced have an O-ring and bushing at each end of the tube, and can be easily removed by hand.)

16. Examine piston bores and needle bearings in front and rear cylinder halves. Replace front and rear cylinders if any cylinder bore is deeply scored or damaged.

17. Needle bearings may be removed if necessary by driving them out with special Thin Wall Socket, J-9399. Insert socket in hub end (inner side) of cylinder head and drive bearing out. To install needle bearing, place cylinder half on Support Block, and insert bearing in end of cylinder head with bearing identification marks up. Use Needle Bearing Installer, J-9432, and drive bearing into cylinder head, Fig. 1-82, until tool bottoms on cylinder face.

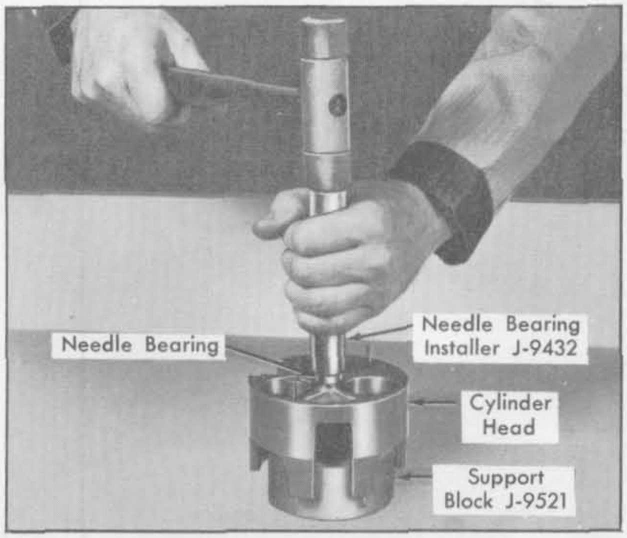


Fig. 1-82 Installing Needle Bearings

18. Wash all parts to be re-used with trichloroethylene, alcohol, or a similar solvent. Air dry parts using a source of clean dry air.

(NOTE: Compressor internal components may be identified by referring to Fig. 1-83.

35. Compressor Internal Mechanism Gaging Operation

1. Install Compressing Fixture, J-9397, on Holding Fixture, J-9396, in vise. Place front cylinder half in Compressing Fixture, flat side down. Front cylinder half has long slot extending out from shaft hole.

2. Secure from service parts stock four zero thrust races and three zero shoe discs.

3. Install a zero thrust race, thrust bearing, and a second zero thrust race on front end of compressor shaft. Lubricate races and bearing with petrolatum.

4. Insert threaded end of shaft through needle bearing in front cylinder half, and allow thrust race and bearing assembly to rest on hub of cylinder.

5. Install a zero thrust race on rear end of compressor shaft so that it rests on hub of axial plate. Then install thrust bearing and a second zero thrust race, Fig. 1-80. Lubricate races and bearing with petrolatum.

6. Lubricate ball pockets of the #1 piston with refrigeration oil and place a ball in each socket. Use balls previously removed if they are to be re-used.

7. Lubricate cavity of a zero shoe disc with refrigeration oil and place shoe disc over ball in front end of piston, Fig. 1-85. Front end of piston has an identifying notch in casting web. Piston rings should not be installed at this time.

(NOTE: Shoe discs should not be installed on rear piston balls during gaging operation.)

8. Rotate shaft and axial plate until high point of axial plate is over #1 piston cylinder bore.

9. Lift shaft assembly and hold front thrust race and bearing assembly against axial plate hub.

10. Position piston over #1 cylinder bore (notched end of piston on bottom and piston straddling axial plate) and lower the shaft to allow piston to drop into its bore, Fig. 1-86.

11. Repeat steps 6 through 10 for pistons #2 and #3.

12. Install rear cylinder half on pistons, aligning cylinder with discharge cross-over tube hole in front cylinder. Tap into place using a plastic mallet.

13. Position discharge cross-over tube holes between a pair of Compressing Fixture bolts to permit access for feeler gage.

14. Install top plate on Compressing Fixture, J-9397.

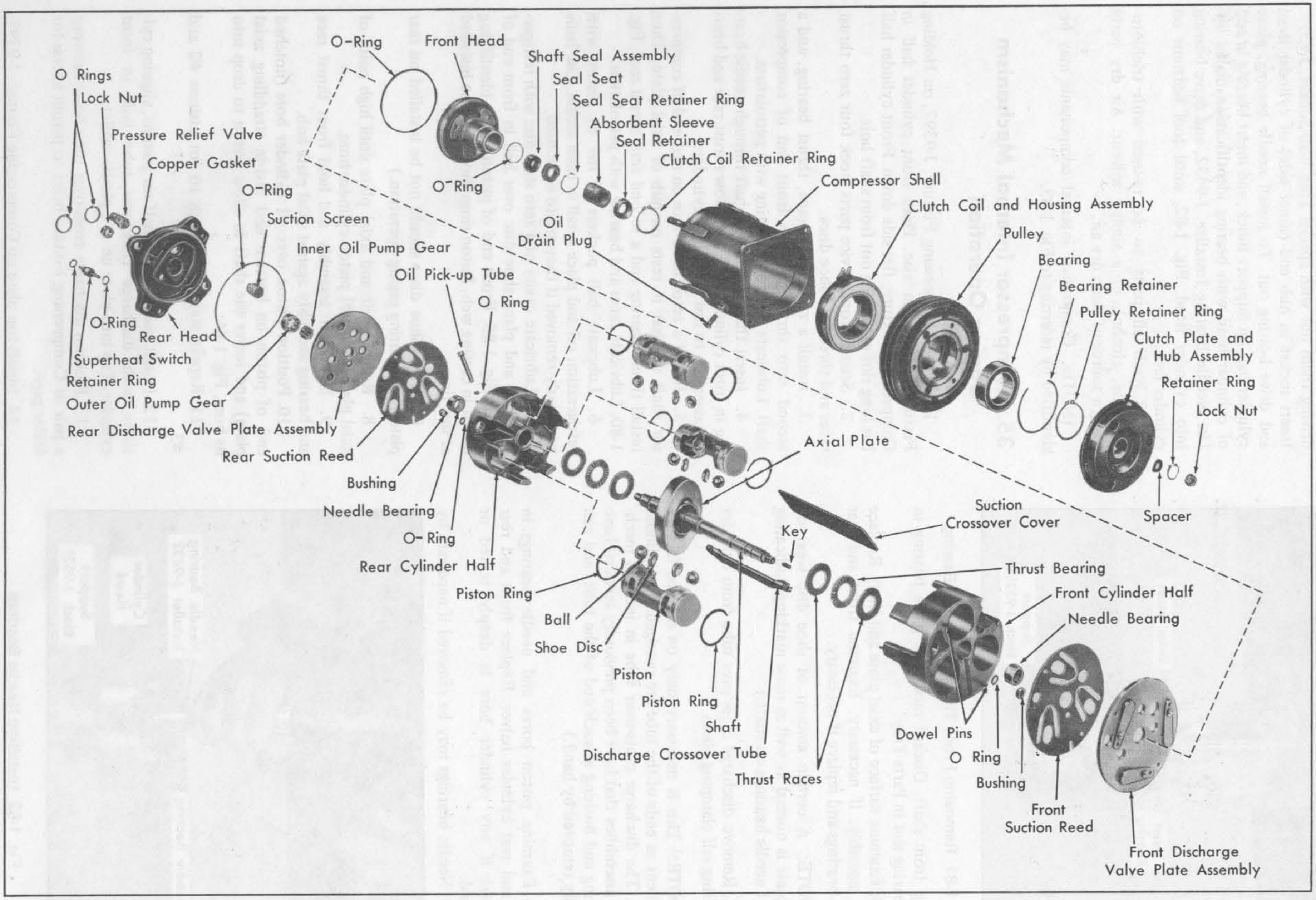


Fig. 1-83 Compressor Disassembled

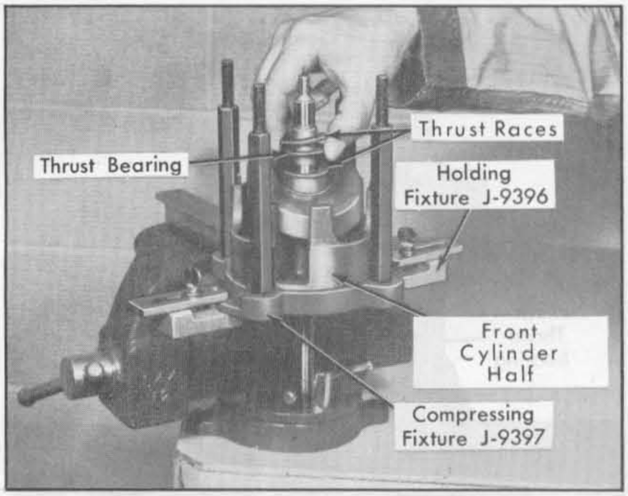


Fig. 1-84 Installing Rear Thrust Races and Bearings

Tighten nuts to 15 foot-pounds torque using a 0-25 foot-pounds torque wrench.

15. Measure clearance between rear ball of #1 piston and axial plate, in following manner:

a. Select a suitable combination of well-oiled feeler gage leaves to fit snugly between ball and axial plate.

b. Attach a spring scale reading in 1 ounce increments to the feeler gage. A distributor point checking scale or Spring Scale, J-544 may be used.

c. Pull on spring scale to slide feeler gage stock out from between ball and axial plate, and note reading on spring scale as feeler gage is removed, Fig. 1-87. Reading should be between 4 and 8 ounces.

d. If reading in step (c) is under 4 or over 8 ounces, reduce or increase thickness of feeler gage leaves and repeat steps (a) through (c) until a reading of 4 to 8 ounces is obtained. Record clearance between ball and axial plate that results in a 4 to 8 ounce pull on spring scale.

16. Rotate shaft 120° and repeat step 15 between same ball and axial plate. Record this measurement.

17. Rotate shaft 120° and again repeat step 15 between these same parts and record measurements.

18. Select a numbered shoe disc corresponding to minimum feeler gage reading recorded in the three checks. Place shoe discs in Parts Tray, in compartment corresponding to piston #1 and rear ball pocket position.

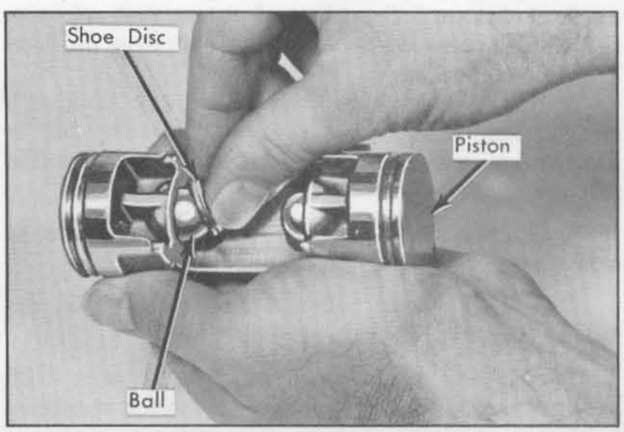


Fig. 1-85 Installing Shoe Disc

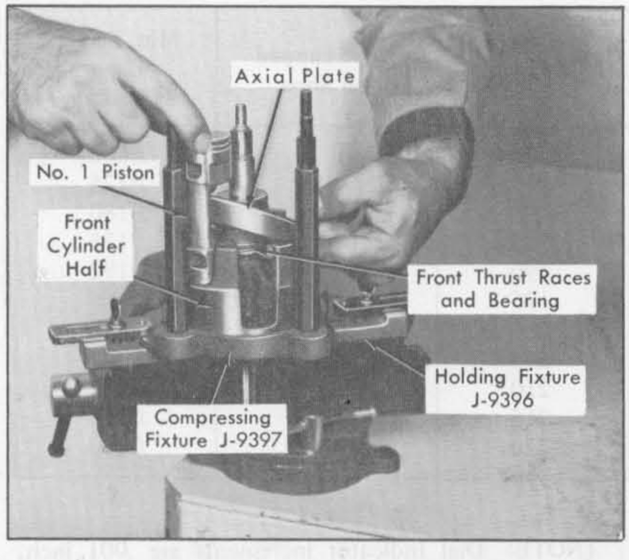


Fig. 1-86 Installing Piston

(NOTE: Shoe discs are provided in .0005 inch (one-half thousandths) variations. There are a total of eleven sizes available for field servicing. All shoe discs are marked with the shoe size, which corresponds to the last three digits of the piece part number. See shoe disc size chart.)

Once proper selection of shoe has been made, the matched combination of shoe disc to rear ball and spherical cavity in piston must be kept in proper relationship during disassembly after gaging operation, and during final assembly of internal mechanism.

19. Repeat in detail the same gaging operation outlined in steps 15 through 18 for pistons #2 and #3.

20. Mount Dial Indicator, J-8001-3, on edge of Compressing Fixture with Clamp, J-8001-1, and Sleeve, J-8001-2, Fig. 1-88. Position Dial Indicator on rear end of shaft and adjust to zero. Push front end of shaft upward and record measurement.

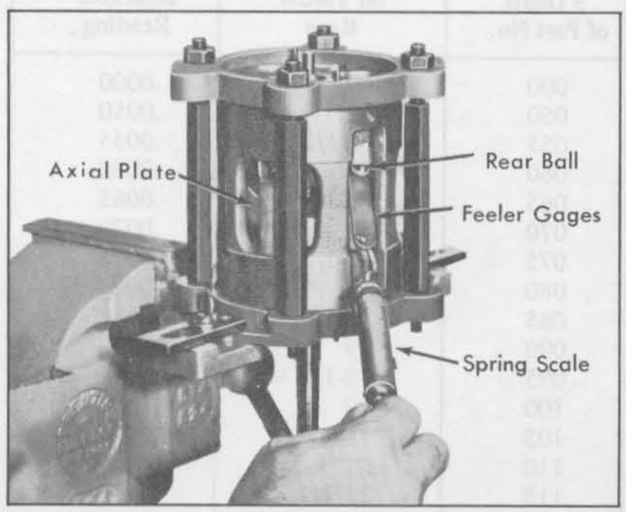


Fig. 1-87 Gaging Rear Piston Ball

Last 3 Digits of Part No.	No. Stamped on Shoe	Min. Feeler Gage Reading
000	0	.0000
175	17-1/2	.0175
180	18	.0180
185	18-1/2	.0185
190	19	.0190
195	19-1/2	.0195
200	20	.0200
205	20-1/2	.0205
210	21	.0210
215	21-1/2	.0215
220	22	.0220

(NOTE: Dial Indicator increments are .001 inch; therefore, reading must be estimated to nearest .0005 inch.)

21. Select a thrust race with a number corresponding to the amount of end play shown. Place thrust race in right hand slot at bottom center of Parts Tray.

(NOTE: Fifteen thrust races are provided in increments of .0005 inch (one-half thousandths) thickness and one zero gage thickness providing a total of 16 sizes available for field service. Thrust races are identified on the part by their thickness in thousands in excess of the thickness of the zero thrust race.)

This number also corresponds to the last three digits of the piece part number. See thrust race size chart.

A tolerance of .0005 inch to .0015 inch is built into thrust races to provide a running clearance between hub

THRUST RACE SIZE CHART

Last 3 Digits of Part No.	No. Stamped on Thrust Race	Dial Indicator Reading
000	0	.0000
050	5	.0050
055	5-1/2	.0055
060	6	.0060
065	6-1/2	.0065
070	7	.0070
075	7-1/2	.0075
080	8	.0080
085	8-1/2	.0085
090	9	.0090
095	9-1/2	.0095
100	10	.0100
105	10-1/2	.0105
110	11	.0110
115	11-1/2	.0115
120	12	.0120

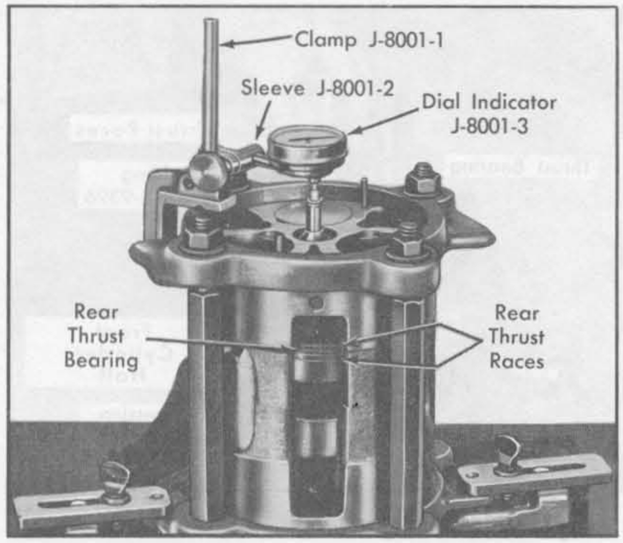


Fig. 1-88 Gaging Rear Thrust Race

surfaces of axial plate and front and rear hubs of cylinder.

22. Remove nuts from top plate of Compressing Fixture, and remove top plate.

23. Separate cylinder halves while unit is in fixture. It may be necessary to use a wood block and mallet.

24. Remove rear cylinder half and carefully remove one piston at a time from axial plate and front cylinder half. Do not lose the relationship of the front ball and shoe disc and rear ball. Transfer each piston, ball, and shoe disc to its proper place in Parts Tray.

25. Remove rear outer zero thrust race from shaft and install thrust race previously selected.

(NOTE: The zero thrust race may be put aside for re-use in additional gaging or rebuilding operations.)

36. Compressor Internal Mechanism Assembly

1. Install a piston ring on each end of #1 piston, with scraper groove toward center of piston.

2. Lubricate ball pockets of pistons with refrigeration oil and place the corresponding balls from the Parts Tray in each pocket.

3. Lubricate cavities of #1 piston shoe discs with refrigeration oil and place zero shoe disc over ball in front end of piston and numbered shoe disc over ball in rear end of piston.

4. Rotate shaft and axial plate until high point of axial plate is over #1 piston cylinder bore.

(NOTE: Make certain that front thrust race and bearing assembly adhere to axial plate hub.)

5. Position piston over #1 cylinder bore with notched end of piston on bottom and piston straddling axial plate and lower shaft to allow piston to drop into its bore.

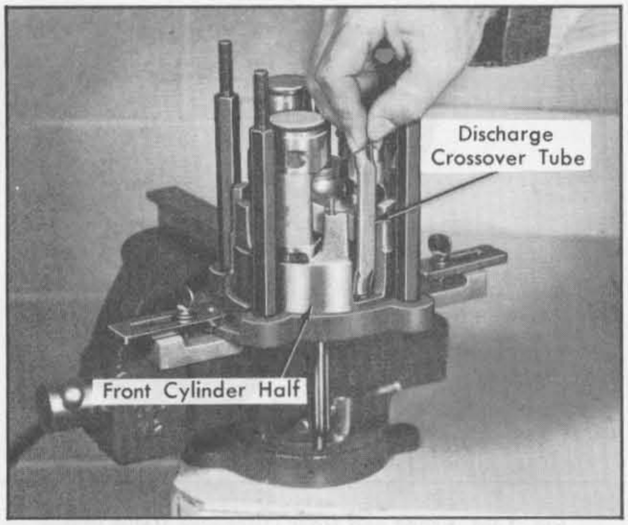


Fig. 1-89 Installing Discharge Crossover Tube

6. Position piston ring gap toward shaft, compress ring and lower ring into front cylinder half.

7. Repeat steps 1 through 6 for pistons #2 and #3.

8. Install new discharge cross-over tube in front cylinder half with bridged surface facing outboard, Fig. 1-89. Make certain that end of tube is properly centered in hole in front cylinder half.

(NOTE: The service discharge cross-over tube is similar to the production type tube except that an O-ring and bushing is used at each end, Fig. 1-90. Do not install O-ring or bushing at this time.)

9. Rotate shaft to position pistons in a stairstep arrangement. Position rings on each piston so that ring gaps are toward shaft, then push rings as far outboard as possible.

10. Place rear cylinder half over shaft and start pistons and rings into cylinder bores.

11. When all three pistons and rings are in their respective bores, align end of discharge cross-over tube with hole in rear cylinder half. Make certain that bridged surface of tube faces outboard for axial plate clearance.

12. When satisfied that all parts are in proper alignment, tap rear cylinder half with a mallet to seat it over the locating dowel pins.

13. Remove internal mechanism from fixture and place on bench.

14. Bending suction cross-over cover slightly, start it into one end of dove tail slot in cylinder halves. Align cover with ends of cylinder faces by gently tapping end of cover with a plastic hammer.

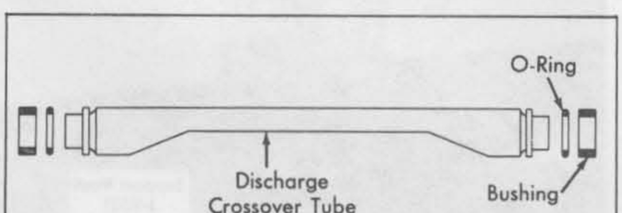


Fig. 1-90 Service Type Crossover Tube

Fig. 1-91 Installing O-Ring on Crossover Tube

37. Compressor Internal Mechanism Installation

1. Place internal mechanism on Internal Assembly Support Block J-9521, with rear end of shaft in block hole.

2. Install new O-ring and bushing on front end of discharge cross-over tube, Fig. 1-91. The O-ring and bushing are service parts only for internal mechanisms that have been disassembled in the field.

3. Install new dowel pins in front cylinder half, if previously removed.

4. Install front suction reed plate on front cylinder half. Align with dowel pins, suction ports, oil return slot, and discharge cross-over tube, Fig. 1-92.

5. Install front discharge valve plate assembly, aligning holes with dowel pins and proper openings in front suction reed plate, Fig. 1-93.

(NOTE: front discharge plate has a large diameter hole in the center, Fig. 1-94.)

6. Coat sealing surfaces on webs of compressor front head casting with 525 viscosity refrigeration oil.

7. Determine exact position of front head casting in relation to dowel pins on internal mechanism. Mark position of dowel pins on sides of front head assembly and on sides of internal mechanism with a grease pencil. Carefully lower front head casting into position, Fig. 1-95, making certain that sealing area around center bore of head assembly does not contact shaft as head assembly is lowered. Do not rotate head assembly to line up with dowel pins, as sealing areas would contact reed retainers.

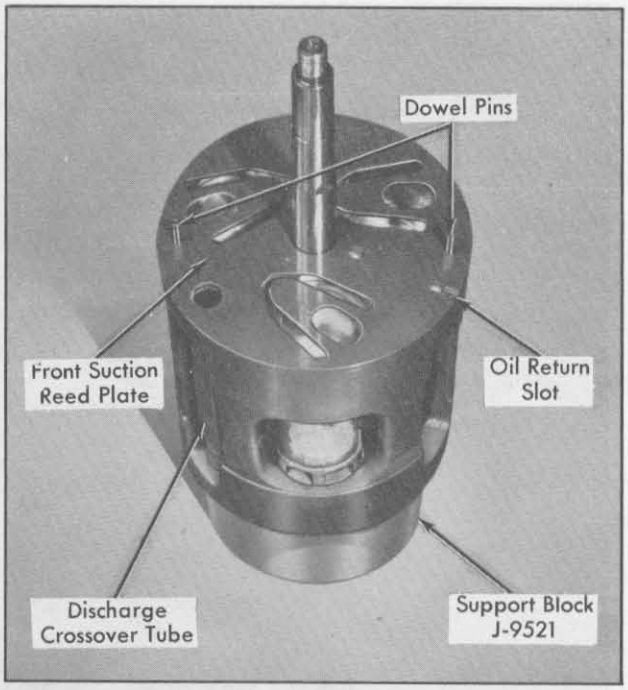


Fig. 1-92 Installing Front Suction Reed

8. Generously lubricate angled groove at lower edge of front head casting with 525 viscosity refrigeration oil and install new O-ring in groove, Fig. 1-96.

9. Coat inside machine surfaces of compressor shell with 525 viscosity refrigeration oil and position shell on internal mechanism, resting on O-ring seal.

10. Using flat side of a small screwdriver, gently press O-ring in around circumference of internal mechanism until compressor shell slides down over internal mechanism. As shell slides down, line up oil sump with oil intake tube hole, Fig. 1-97.

11. Holding support block, invert assembly and place

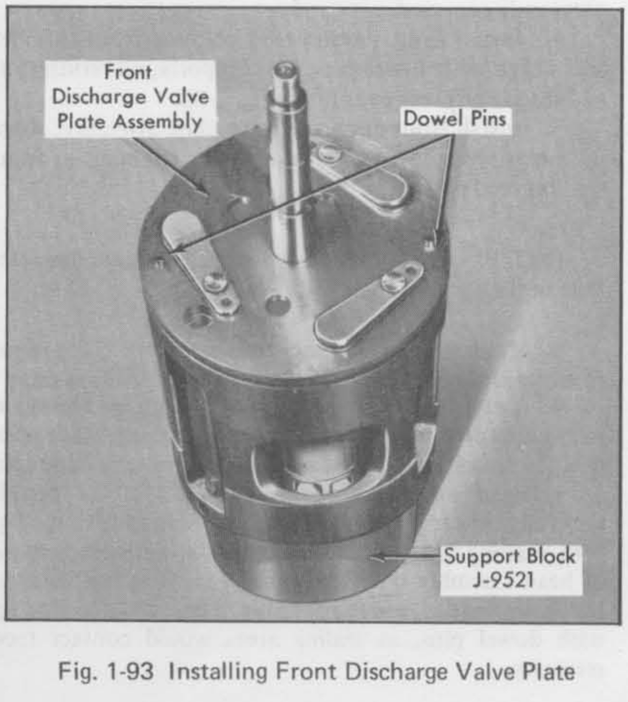


Fig. 1-93 Installing Front Discharge Valve Plate

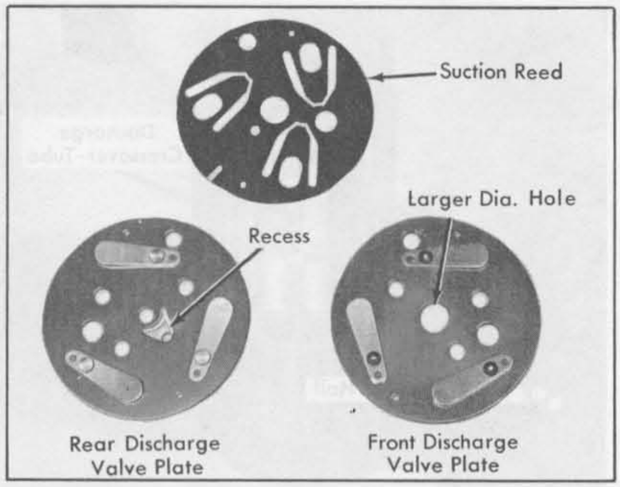


Fig. 1-94 Front and Rear Discharge Valve Plates

in holding fixture with front end of shaft down. Remove support block.

12. Install new dowel pins in rear cylinder half if previously removed.

13. Install new O-ring in oil pick-up tube cavity.

14. Lubricate oil pick-up tube and install in cavity, rotating compressor mechanism to align tube with hole in shell baffle, Fig. 1-98.

15. Install new O-ring and bushing on rear of discharge cross-over tube.

16. Install rear suction reed over dowel pins with slot toward sump.

17. Install rear discharge valve plate assembly over dowel pins with reed retainers up.

18. Position inner oil pump gear over shaft with previously applied identification mark up.

19. Position outer oil pump gear over inner gear with previously applied identification mark up and, when standing facing oil sump, position outer gear so that it meshes with inner gear at the 9 o'clock position and

Fig. 1-95 Installing Front Head Casting

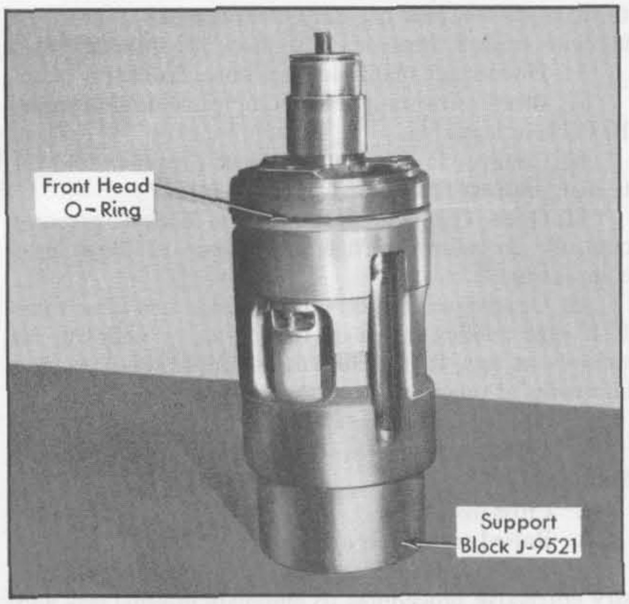


Fig. 1-96 Front Head O-Ring Installed

cavity between gear teeth is at 3 o'clock position, Fig. 1-99.

20. Generously oil rear discharge valve plate assembly around outer edge where large diameter O-ring will be placed. Oil valve reeds, pump gears, and area where sealing surface will contact rear discharge valve plate.

21. Lubricate new head to-shell O-ring and install on rear discharge valve plate, in contact with shell.

22. Install suction screen in rear head casting, using care not to damage screen.

23. Coat sealing surface on webs of compressor rear head casting with 525 viscosity refrigeration oil.

24. Install rear head assembly over studs on compressor shell. The two lower threaded compressor mounting holes should be in alignment with the compressor sump.

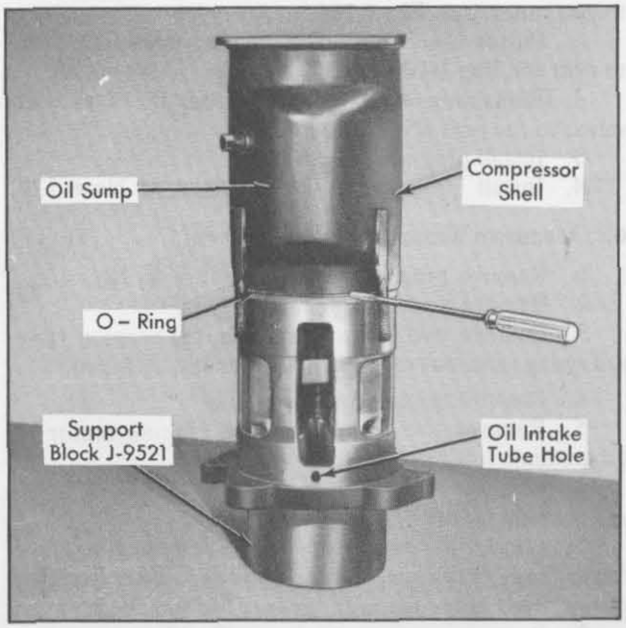


Fig. 1-97 Installing Compressor Shell

Fig. 1-98 Installing Oil Pick-Up Tube

Make certain that suction screen does not drop out of place when lowering rear head into position.

(NOTE: If rear head assembly will not slide down over dowels in internal mechanism, twist front head assembly back and forth very slightly by hand until rear head drops over dowel pins.)

25. Install nuts on threaded shell studs and tighten evenly to 20 foot-pounds torque using a 0-25 foot-pounds torque wrench.

26. Invert compressor in holding fixture and install shaft seal as described in Note 31b.

27. Install compressor clutch coil and housing assembly as described in Note 30b.

28. Install compressor pulley and bearing assembly as described in Note 28b.

29. Install compressor clutch plate and hub assembly as described in Note 27b.

30. Add 525 viscosity refrigeration oil as described in Note 44.

31. Check for external and internal leaks as described in Note 38.

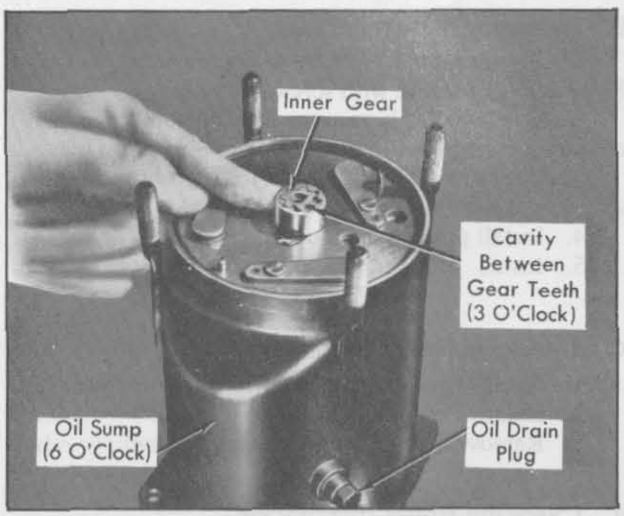


Fig. 1-99 Positioning Oil Pump Gears

38. Compressor Leak Testing (External and Internal)

1. Rotate clutch hub clockwise several turns to pick oil up from sump and carry it to piston rings and oil seals.
2. Install Test Plate, J-9527, on rear head of compressor.
3. Attach center hose of gage manifold set on Charging Station to a refrigerant drum standing in an upright position and open valve on drum.
4. Connect charging station high and low pressure lines to corresponding fittings on Test Plate.

(NOTE: High pressure fitting is one farthest from high pressure relief valve on compressor rear head.)

5. Open valve 1 (low pressure control), valve 2 (high pressure control), and valve 4 on Charging Station to allow refrigerant vapor to flow into compressor.
6. Using Leak Detector Torch, J-6084, check for leaks at pressure relief valve, oil drain fitting, compressor rear head seal, compressor front head seal and compressor shaft seal. After checking, shut off valve 1 and valve 2 on Charging Station.
7. If an external leak is present, perform the necessary corrective procedures and repeat steps 1 through 6 to make certain leak has been corrected before proceeding with steps 8 through 12 to check for internal leaks.
8. Disconnect manifold gage hoses from test plate.
9. Bleed refrigerant from compressor until down to 10 P.S.I. or less.
10. Connect low pressure hose of gage manifold set to high pressure fitting on Test Plate, J-9527.
11. Open charging station valve 1 (low pressure control) to allow refrigerant vapor to flow into compressor.
12. Observe reading on pressure gage then close valve 1. If gage reading drops to 10 pounds or under in 30 seconds or less, it indicates that compressor is leaking internally, at one or more of the following points:
    a. Reed valves.
    b. Teflon seals at rear head, or sealing surfaces on front head.
    c. Cross-over tube.
    d. Raised section on cylinder face
13. If a leak is indicated in step 12, perform necessary corrective procedures to eliminate internal leak and repeat steps 1 through 12 to make certain external and internal leaks are corrected. If no leak was indicated, proceed with step 14.
14. Disconnect charging station from test plate.
15. Remove test plate from compressor.

PROGRAMMER OVERHAUL

39. Programmer Disassembly

a. Transducer Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Disconnect transducer electrical leads at transducer.
4. Remove vacuum hoses from transducer vacuum ports.
5. Remove screw with clip holding transducer in place and remove transducer.

b. Transducer Installation

1. Position transducer in programmer as shown in Fig. 1-100 and secure with screw and clip.
2. Connect black vacuum hose to top port (small) of transducer and white hose to lower port (large).
3. Connect electrical leads to transducer: yellow wire to inside terminal; gray wire to outside terminal.
4. Install programmer cover.
5. Install programmer as described in Note 12b.

c. Checking Relay Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Remove four hoses from relay and remove relay.

d. Checking Relay Installation

1. Position checking relay in programmer with ports 1 and 2 towards vacuum motor as shown in Fig. 1-100.
2. Make the following vacuum hose connections:
    a. White hose from transducer wraps around vacuum motor and connects to port #2, Fig. 1-100.

    (NOTE: If this vacuum hose is replaced, the replacement hose <u>must be</u> at least 15" long).

    b. Short (yellow) hose connects remaining port (#1) to vacuum motor, Fig. 1-100.
    c. Purple hose from left hand port of vacuum valve to port #3, Fig. 1-100.
    d. Remaining black hose (R.H. nipple of vacuum valve) to the port #5, Fig. 1-100.
3. Install programmer cover.
4. Install programmer as described in Note 12b.

e. Vacuum Motor Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Remove two screw/studs securing vacuum valve and swing valve out of way with hoses still attached.
4. Remove tension spring and clip.
5. Remove two screws securing vacuum motor to programmer housing.
6. Remove vacuum hose between checking relay and vacuum motor.
7. Loosen the output shaft bracket enough to allow the vacuum motor mechanism to be separated from the output shaft arm.
8. Remove vacuum motor with blower contact assembly remaining on circuit board.

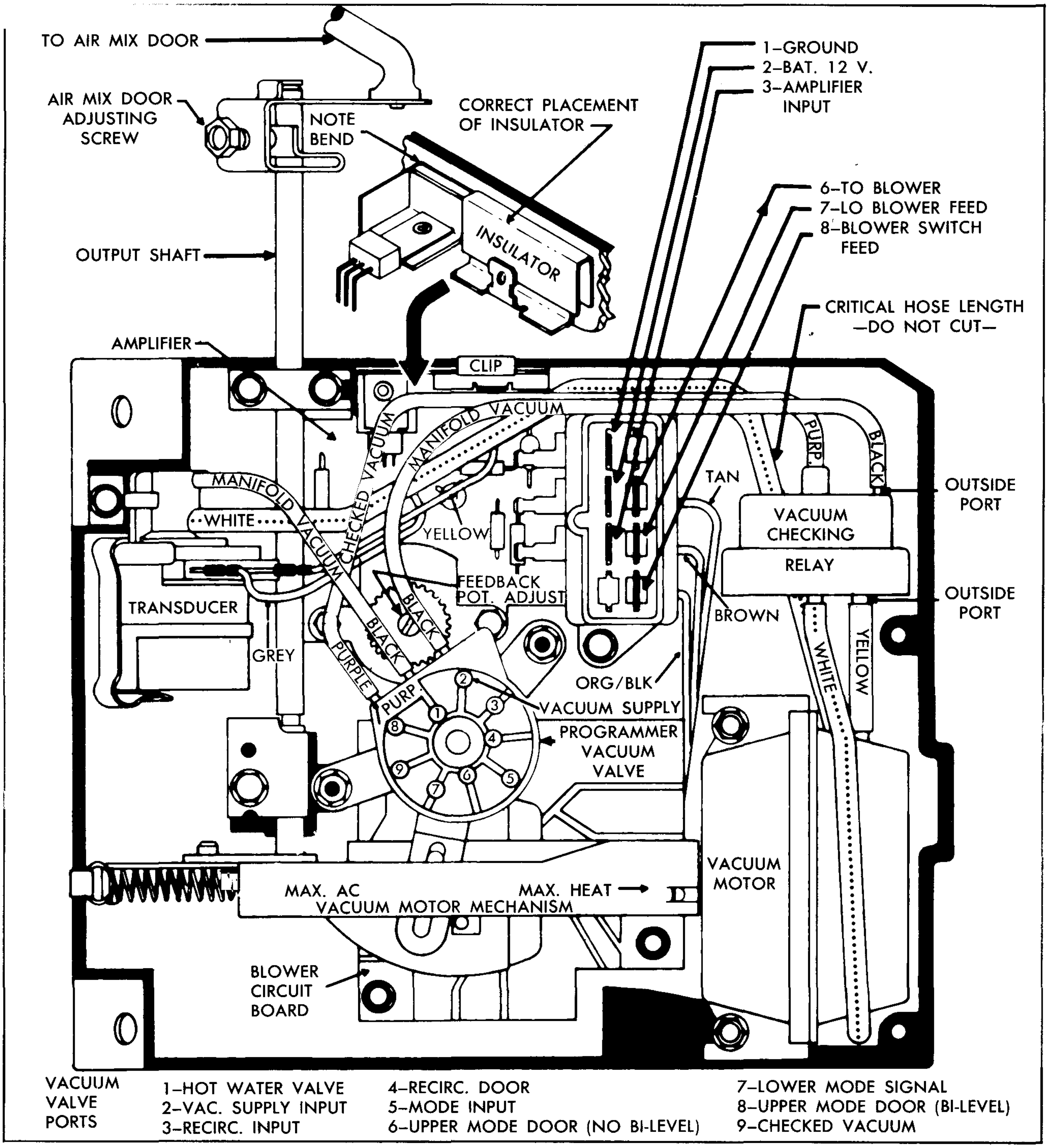


Fig. 1-100 ATC Programmer

(NOTE: Handle blower contact assembly carefully as ent balls may fall out. If blower contact assembly is ıoved, mark a tooth on the feedback pot and a corresponding notch on blower switch gear.)

f. Vacuum Motor Installation

1. If blower contact assembly was removed, position blower contact assembly to vacuum motor. Use care to be sure that two balls do not fall out. Engage stud of contact in slot of gear.

2. Align marks on feedback pot and blower contact gear and position vacuum motor to programmer housing. Check for third ball in casting pivot hole.

3. With vacuum motor mechanism in position on output shaft arm, tighten retaining screw on output shaft bracket.

4. Secure vacuum motor in position with two screws.

5. Install programmer vacuum valve in position and secure with two screw/studs. Check for link-up to vacuum motor.

6. Install spring between vacuum motor arm and clip around outside edge of housing.

7. Install short vacuum hose (yellow) between vacuum motor and checking relay.

8. Install programmer cover.
9. Install programmer as described in Note 12b.

g. Programmer Vacuum Valve Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Remove three vacuum hoses from nipples on side of valve.
4. Remove two screw/studs securing vacuum valve to housing and remove valve.

h. Programmer Vacuum Valve Installation

1. Make sure vacuum valve spring is in place.
2. Position vacuum valve to programmer housing with drive arm on boss of vacuum motor mechanism.
3. Secure valve with two screw/studs.
4. Install vacuum hoses as follows:

a. Left hand nipple has purple hose from checking relay lower port connected to it, see Fig. 1-100.

b. Center nipple has black hose from transducer top port connected to it, see Fig. 1-100.

c. Right hand nipple has black hose from checking relay upper right hand port connected to it, see Fig. 1-100.

5. Install programmer cover.
6. Install programmer as described in Note 12b.

i. Blower Circuit Board Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Remove two screw/studs securing vacuum valve to programmer housing and swing valve out of way with hoses still attached.
4. Remove vacuum motor as described in part e of this note.
5. Remove blower contact assembly.
6. Remove two screws securing multiple connector at amplifier.
7. Remove three screws securing circuit board to programmer housing and remove circuit board, with connector attached.

j. Blower Circuit Board Installation

1. Position connector and circuit board to programmer and secure with three screws. Refer to Fig. 1-100.
2. Install multiple connector and secure with two screws.
3. Position blower contact assembly to vacuum motor. Be sure balls do not fall out. Engage stud of contact in slot of gear.
4. Install vacuum motor as described in part f of this note.
5. Position programmer vacuum valve in location on programmer and secure with two screw/studs. Check for link-up to vacuum motor.
6. Move checking relay into position and install short yellow hose between vacuum motor and checking relay.
7. Install programmer cover.
8. Install programmer as described in Note 12b.

k. Amplifier Removal

1. Remove programmer as described in Note 12a.
2. Remove programmer cover.
3. Remove two screw/studs securing programmer vacuum valve to programmer housing and swing valve out of way with hoses still attached.
4. Remove two hoses from transducer.
5. Disconnect electrical connections at transducer.
6. Remove clip and plastic protector from edge of programmer housing.
7. Remove two screws securing multiple connector to amplifier and remove multiple connector.
8. Mark a tooth on the feedback pot and the corresponding notch on the blower gear.
9. Remove two nuts securing feedback pot to housing and remove amplifier with pot attached.

l. Amplifier Installation

1. Install amplifier in position in programmer housing, Fig. 1-100.
2. Position feedback pot over studs with mark on pot aligned with mark on wheel and secure amplifier and pot with two nuts.
3. Position multiple connector over amplifier terminals and secure connector with two screws.
4. Install plastic guard over edge of programmer housing as shown in Fig. 1-100 and secure with clip.
5. Connect transducer electrical leads as follows:

a. Yellow wire to inboard terminal.

b. Gray wire to outboard terminal.

6. Install transducer vacuum hoses as follows:

a. Black hose from programmer vacuum valve to top (small) port of transducer, Fig. 1-100.

b. White hose from checking relay to bottom (large) port of transducer, Fig. 1-100.

7. Position programmer vacuum valve in location on housing and secure with two screw/studs.
8. Install programmer cover.
9. Install programmer as described in Note 12b.

STANDARD SERVICE PROCEDURES

40. Differences in Air Conditioner Equipped Cars

Cadillac cars equipped with an air conditioner incorporate special engineering features to compensate for the extra weight, power requirements, and electrical loads demanded by the air conditioner system. The following features should be kept in mind when working on air conditioned cars.

a. Radiator Assembly

A special radiator is used with additional copper tubing for better cooling.

b. Power Steering Pump Pulley

A double sheave pulley is used on air conditioned cars.

c. Vapor Return Line

A vapor return line is connected from the fuel pump to the fuel tank to reduce the possibility of vapor lock.

d. Generator

A 63 ampere generator is used to accommodate the greater electrical load on all cars except the 6F which uses an 80 ampere model.

e. Suspension

Front coil springs have higher static load rate to compensate for additional weight of the system's components (except 6L).

41. Handling Refrigerant and Refrigeration Components

a. Maintaining Chemical Stability

The efficient operation of the air conditioning system is dependent on the pressure-temperature relationship of pure refrigerant 12. As long as the system contains pure refrigerant 12 (plus a certain amount of refrigeration oil which mixes with the refrigerant), it is considered to be chemically stable.

When foreign materials, such as dirt, air or moisture are allowed to get into the system, they will change the pressure-temperature relationship of the refrigerant. The system will no longer operate at the proper pressures and temperatures, and the efficiency of the system will decrease.

The following general practices should be observed to insure chemical stability in the system:

1. Whenever it becomes necessary to disconnect a refrigerant connection, wipe away any dirt or oil at or near the connection to eliminate the possibility of dirt entering the system. Both sides of the connection should be immediately capped or plugged to prevent the entrance of dirt, moisture, or foreign material. All air contains moisture. Air that enters any part of the system will carry moisture with it and the exposed surfaces will collect the moisture quickly.
2. Tools should be kept clean and dry. This includes the Charging Station and the Gage Set.
3. When adding oil, the container and the transfer tube through which the oil will flow should be exceptionally clean and dry in order to keep the refrigeration oil as moisture-free as possible. For this reason, the oil container should not be opened until ready for use, and should be capped immediately after use.
4. When it is necessary to open a system, have everything needed ready and handy so that as little time as possible will be required to perform the operation. Do not leave the system open any longer than is necessary.
5. Any time the system has been opened and sealed again, it must be properly evacuated, as described in Note 44c.

CAUTION: Use only refrigerant from a reputable dealer, as contaminated refrigerant will not only lower the efficiency of the system, but will damage the unit. Use only refrigerant 12 as refrigerant for the Cadillac system, since any other refrigerant will damage the compressor or other parts by incorrect pressure-temperature relationship.

b. Precautions in Handling Refrigerant

Refrigerant 12 is stored and shipped as a liquid under pressure in heavy metal drums in 10, 25, and 145 pound sizes and in 1, 12, and 25 pound disposable containers. Correctly handled, it is as safe as compressed air. Incorrectly handled, it can explode and cause serious damage.

WARNING: IN HANDLING REFRIGERANT DRUMS, ALWAYS OBSERVE THE FOLLOWING SAFETY PRECAUTIONS:

1. DO NOT LEAVE DRUM UNCAPPED IF DRUM IS SO EQUIPPED. THE METAL CAP FURNISHED WITH THE DRUM WHEN IT IS SHIPPED IS TO PROTECT THE VALVE IN CASE THE DRUM IS ACCIDENTALLY KNOCKED OVER. THIS ELIMINATES THE POSSIBILITY OF THE DRUM FLYING THROUGH THE SHOP AND CAUSING SERIOUS DAMAGE TO PEOPLE AND PROPERTY. A SAFETY PLUG IS PROVIDED ON THE VALVE IN CASE THE TEMPERATURE EXCEEDS THE SAFE LIMITS OF THE DRUM. THE CAP IS DESIGNED SO THAT IF THE SAFETY PLUG AT THE VALVE SHOULD BLOW, THE REFRIGERANT WILL ESCAPE WITHOUT CAUSING THE DRUM TO MOVE.
2. DO NOT OVERFILL DRUM. A SAFETY PLUG IS PROVIDED IN CASE THE TEMPERATURE OF THE REFRIGERANT EXCEEDS THE SAFE LIMITS OF THE DRUM. HOWEVER, IF THE DRUM IS OVERFILLED, THE PRESSURE CREATED COULD CAUSE THE DRUM TO EXPLODE BEFORE THE TEMPERATURE RISES TO THE POINT WHERE THE SAFETY PLUG WOULD BURST AND ALLOW THE REFRIGERANT TO ESCAPE.
3. DO NOT CARRY THE DRUM IN THE PASSENGER COMPARTMENT OF A CAR. ALWAYS PLACE DRUM IN THE LUGGAGE COMPARTMENT OF CAR. IF A DRUM IS CARRIED IN AN OPEN TRUCK SHIELD IT FOR PROTECTION FROM THE SUN'S RAYS. THIS HEAT COULD INCREASE THE PRESSURE ENOUGH TO CAUSE SAFETY PLUG TO BURST.
4. DO NOT SUBJECT DRUM TO HIGH TEMPERATURE WHEN CHARGING SYSTEM -- USE WATER NO WARMER THAN 125°F TO HEAT DRUM. NEVER PLACE DRUM ON STEAM RADIATOR OR STOVE, OR USE TORCHES FOR HEATING DURING CHARGING.
5. DO NOT DISCHARGE REFRIGERANT 12 INTO AREAS WHERE THERE IS AN EXPOSED FLAME OR WHERE IT COULD BE DRAWN INTO THE ENGINE AIR INTAKE WHEN THE ENGINE IS OPERATING. CON-

CENTRATIONS OF THIS GAS IN CONTACT WITH A FLAME MAY PRODUCE A POISONOUS GAS.

6. ALWAYS WEAR GOGGLES WHEN DOING WORK THAT INVOLVES OPENING THE REFRIGERANT LINES. AN ACCIDENT CAN EASILY CAUSE LIQUID REFRIGERANT TO STRIKE THE FACE. IF GOGGLES PROTECT THE EYES, THE LIKELIHOOD OF SERIOUS INJURY WILL BE REDUCED. A SKIN INJURY CAN BE BATHED WITH COLD WATER AND TREATED IN THE SAME MANNER AS FROSTBITE. IF REFRIGERANT LIQUID SHOULD STRIKE THE EYE, PROCEED AS FOLLOWS:

a. DO NOT RUB IT IN. SPLASH THE AFFECTED AREA WITH QUANTITIES OF COLD WATER TO BRING THE TEMPERATURE GRADUALLY ABOVE THE FREEZING POINT. APPLY A FEW DROPS OF ANTISEPTIC OIL TO PROVIDE A PROTECTIVE FILM.

b. IF IRRITATION CONTINUES, WASH THE EYES WITH A WEAK SOLUTION OF BORIC ACID.

c. CONSULT AN EYE SPECIALIST IMMEDIATELY FOR TREATMENT.

c. Welding

Excessive heat applied to any section of the refrigerant lines will create excessively high pressures. For this reason, welding should not be performed on any portion of the car adjacent to the refrigerant units or lines.

d. Undercoating

To simplify service operations, undercoating should not be applied to any connections or rubber lines of the refrigeration system. While it is permissible to undercoat the metal refrigerant lines, all flare joints and connections should first be masked.

e. Collision Service

It is very important that the air conditioning system be inspected as soon as possible whenever a car so equipped has been involved in a collision. If the system has been opened as the result of a collision, it will permit the entry of air, moisture, and dirt that will cause internal damage. As the length of time the system has been open and the extent of damage to the components will govern the replacement of parts and the service operations required, a definite procedure cannot be recommended to cover all cases. The following, however, may be used as a guide:

1. Make certain clutch is disengaged, if car is to be operated before repairs are made.
2. Inspect all units and lines, noting any damage.

a. If condenser is damaged, it should be replaced. No repairs such as soldering, brazing or welding should be attempted.

b. Replace dehydrator-receiver assembly if damaged, leaking, clogged or restricted, or if system was open for any period of time.

3. Check compressor and clutch pulley for cracks. If compressor does not show evidence of external damage, it may be used.

f. Handling Components

1. Lines should be kept sealed and dehydrated in stock. Do not remove shipping caps from lines until just before installation.
2. Always use two wrenches when tightening fittings to prevent twisting the hoses or soft aluminum tubing. Lubricate all fittings with refrigeration oil to allow the joint to be tightened without twisting the pipe.
3. Cap ends of lines that have been disconnected for any reason, to prevent entrance of moisture or dirt.
4. Gage set and lines should be kept clean and free from moisture.
5. Do not leave refrigeration oil container open any longer than necessary, as the special oil is moisture-free, but will rapidly absorb moisture from the air.
6. Use Vacuum Pump, J-5428, or Charging Station, J-23500,to remove any air or moisture that may have entered the system when it was opened to replace a part.

g. Replacing Components

When removing any components or lines from the system, they must be capped and plugged immediately to prevent exposing them to moisture.

All components of the air conditioning system are shipped dehydrated and sealed. They are to remain sealed until just prior to making connections and should be at room temperature before uncapping to prevent condensation of moisture from the air that enters the components. They should not be uncapped any longer than necessary to make a connection.

All precautions should be taken to prevent damage to the fitting and connections. Any fittings with grease or dirt on them should be cleaned prior to assembly, using a clean cloth dipped in alcohol. If dirt, grease or moisture gets inside lines and cannot be removed, lines may have to be replaced.

All blue O-rings for making closures for shipment should be discarded and new black O-rings used for making final refrigerant connections.

Use a small amount of refrigerant oil on all tubes and hose joints and lubricate the O-rings with this oil before assembly. Always slip the lubricated O-ring onto the flange tube to insure proper locating and sealing.

All O-ring connections should be tightened with torque wrenches and a crowfoot wrench (used at a 90° angle to the torque wrench for accurate reading,) in accordance with the table on page 1-114. Note that the torque specified for aluminum tubing is less than that specified for steel tubing.

If a connection is made with steel to aluminum, use torques for aluminum. In other words, use the lower torque specification. Use steel torques only when both ends of connection are steel.

Backing wrenches of the required size must be used during the final tightening of all O-ring and flare-type connections.

Pre-formed refrigeration system lines are not serviced; however, bulk tubing is available along with a selection of fittings so that a replacement hose may be assembled. Drawings (such as Fig. 1-101) are included several places in this service manual showing the routing and attach-

ment of these lines. When assembling refrigerant lines extreme care is required to prevent dirt, rubber chips, etc. from entering the system. A short blast of refrigerant is recommended to clear the hose of contamination. Hoses may be lubricated with refrigeration oil to aid in assembly.

42. Maintenance and Inspection

The following items should be checked every spring and fall and whenever the car is brought in to check the air conditioning.

a. Functional Test of the Air Conditioner

1. See Note 47 to perform the test.

b. Sight Glass Check

Check sight glass through access hole in radiator cradle for full charge of refrigerant. If system is low, leak test and make necessary repairs. See Note 43.

(NOTE: It is normal for some foaming to occur in the sight glass with an outside air temperature of 70°F or below.)

c. Leaks

If there is evidence of oil leaks, leak test entire system and make necessary repairs. See Note 45.

d. Coolant Level

Check coolant for proper level. See Section 6, Note 3.

e. Belt Tension

Check tension of belts as described in Section 6, Note 9.

f. Compressor Clutch

Observe clutch to make certain it is engaging and disengaging while moving the selector lever between VENT and LO with the engine idling.

43. Checking Refrigerant Charge

Bubbles in the sight glass do not always indicate that the system is low on refrigerant. If the system is at a control point, bubbles may appear in the sight glass even though the system is fully charged.

A certain amount of foaming is also normal with an outside air temperature of 70°F or below.

Check refrigerant charge at the sight glass and proceed as described below to make certain that system is not at bubble producing control point.

1. Connect Charging Station low pressure line to gage fitting on suction throttling valve.
2. Move Automatic Climate Control lever to AUTOMATIC position and set temperature dial to 65°F.
3. Run engine at 1500 rpm for 5 to 7 minutes to stabilize system.
4. Observe low pressure reading. Low pressure gage should read approximately 29.5 ± .5 pounds.
5. Slow down engine.
6. Maintain engine speed at this level, wait several minutes and then observe sight glass.

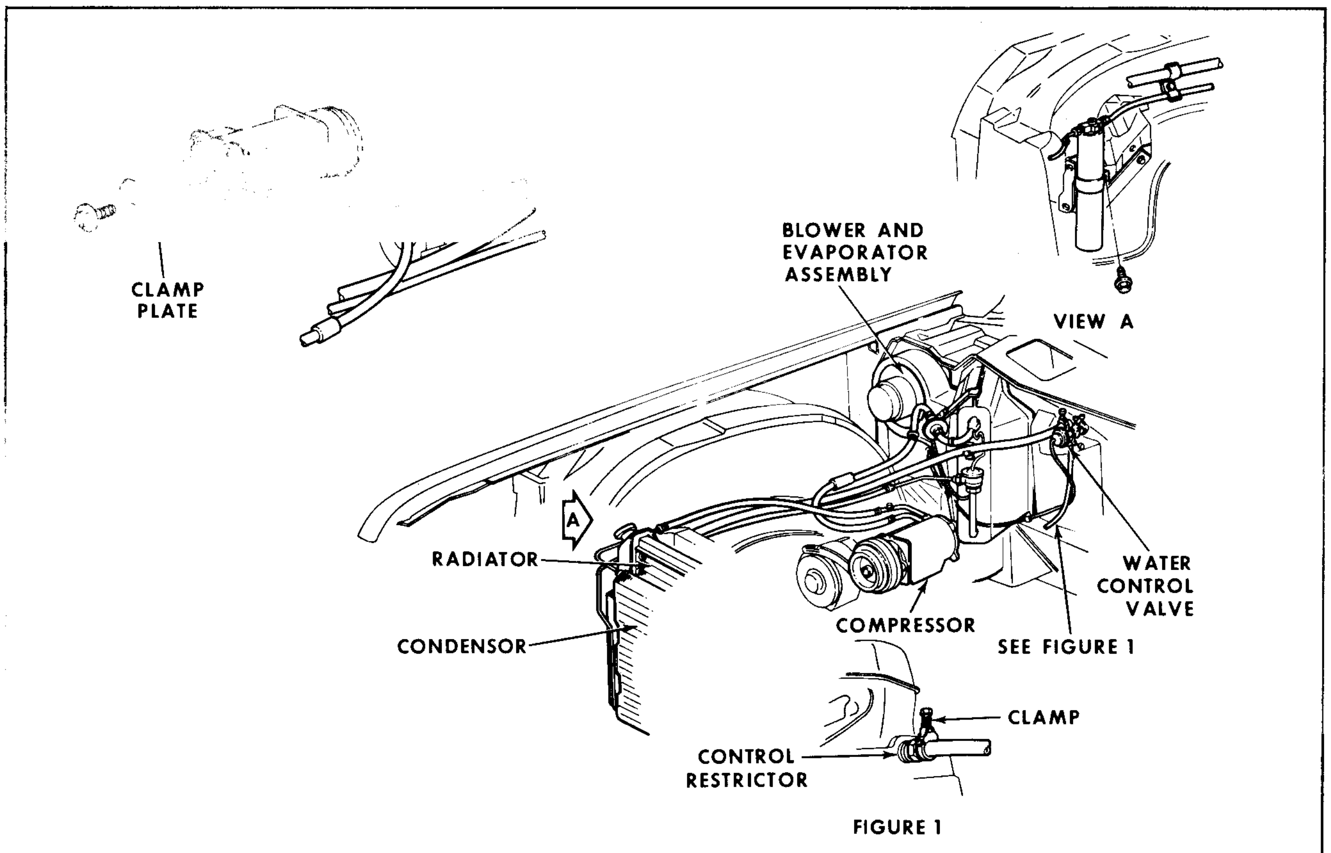


Fig. 1-101 Refrigerant and Water Hoses

a. If a solid column of refrigerant appears in sight glass, it is an indication that charge in system is adequate or overcharged.

b. If bubbles appear in sight glass, it is an indication that system is low on refrigerant. Add refrigerant to system as described in Note 44.

44. Purging, Evacuating and Charging the Refrigeration System

a. Purging Refrigerant From System

When replacing any air conditioner component, the system must be purged (drained) of refrigerant. The purpose is to lower pressure inside the system so that a component part can be safely removed. Following is a simplified procedure for purging refrigerant from system.

WARNING: ALWAYS WEAR GOGGLES WHEN DOING WORK THAT INVOLVES OPENING REFRIGERANT LINES.

1. Remove caps from pressure fittings on high pressure line and on suction throttling valve.
2. Install a length of 5/16" diameter clear plastic hose over the threaded end of adapter, J-5420. Secure with a clamp.
3. Install hose from J-5420 into a graduated container such as an empty refrigerant oil bottle.
4. Loosely install Gage Adapter, J-5420, on high side pressure fitting.
5. Tighten gage adapter and allow system to discharge at a rapid rate into the container.

(NOTE: Rapid discharge will cause oil loss; container is necessary to collect oil.)

6. Measure oil collected in container and discard old oil.
7. New refrigeration oil should be added to the system as described in Part F of this note. If this method is not practical, oil lost during rapid discharge must be replaced as follows.
8. Connect charging station low pressure line to fitting on STV.
9. Connect J-5420 to high pressure fitting.
10. Place hose from J-5420 into a container of fresh refrigeration oil.

(NOTE: Container should have more oil than was drained from system to prevent trying to draw all oil from bottle into system.)

CAUTION: Care should be exercised during this operation to ensure that no dirt is drawn into the system.

11. Start vacuum pump and draw into system, as much oil as was lost during rapid discharge. Remove hose from container when this point is reached.
12. Elevate hose to allow oil in hose to be drawn into system.
13. Remove J-5420 and proceed with normal evacuation and charging (Parts C and D of this note.)

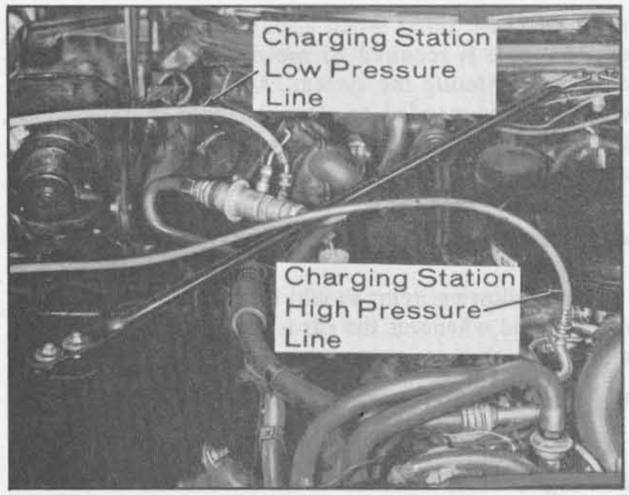


Fig. 1-102 Connecting Charging Station Lines

b. Connection Charging Station, J-23500

1. Remove caps from high pressure fitting on high pressure line and the gage fitting on suction throttling valve.
2. Make certain that all valves on charging station are closed.
3. Install Gage Adapters, J-5420, on Charging Station high and low pressure lines.
4. Connect charging station high pressure line to fitting on high pressure line and low pressure line to gage fitting on suction throttling valve, Fig. 1-102.

c. Evacuating System

Whenever the air conditioning system is opened for any reason, it should not be put into operation again until it has been evacuated several times. For this operation use Charging Station, J-23500, to remove air and moisture that may have entered the system.

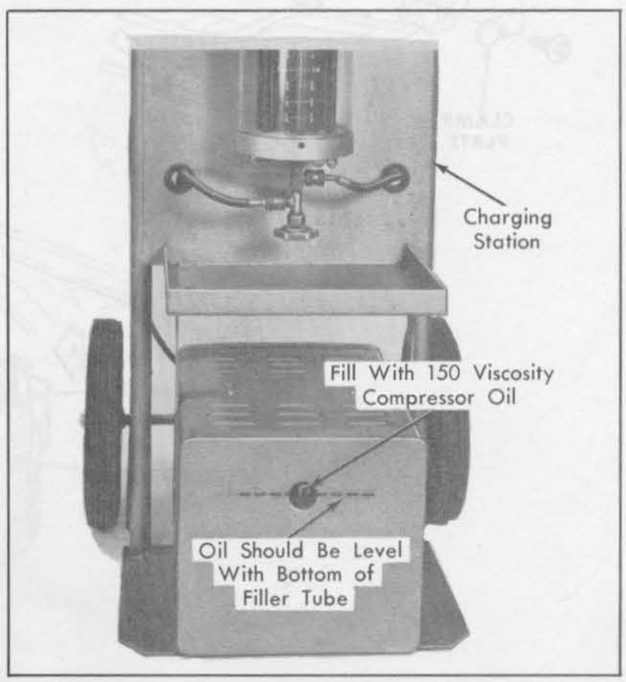


Fig. 1-103 Vacuum Pump Oil Level

Check Charging Station vacuum pump oil level at oil filler screw on front of pump. Oil should be level with bottom of filler tube, Fig. 1-103. Add 150 viscosity refrigeration oil to bring to proper level. Change the oil in pump every 250 hours of operation. A small amount of 150 viscosity oil may be drawn into the pump occasionally to insure protection of internal parts during periods of disuse. If the pump should fail to start, check capacitor or relay.

1. Purge system as described in part a of this note.
2. Connect Charging Station high and low pressure lines as described in part b of this note.
3. Plug in Charging Station to 110 volt outlet and turn on vacuum pump switch.
4. Open valve 1 (low pressure control), valve 2 (high pressure control), and valve 3 (vacuum control).
5. Operate to obtain 28 inches of vacuum, then continue to operate pump for ten minutes.

(NOTE: In all evacuating procedures specification of 28-29" of vacuum is used. This evacuation can only be attained at or near sea level. For each 1000 feet above sea level where this operation is being performed, specification should be lowered by one inch of mercury vacuum. At 5000 feet elevation only 23" to 25" of vacuum can normally be obtained.)

6. While evacuating the system, add refrigerant to cylinder on Charging Station by opening valves on refrigerant drum and at bottom of cylinder (valve 4 must be closed). Open valve on top of cylinder until proper liquid level is obtained in sight tube, and then close both top and bottom valves on cylinder.
7. Close valves 1, 2 and 3 and turn off vacuum pump switch. System should hold vacuum, unless there is a leak present.
8. Slowly open valves 2 and 4, allowing 1/2 to 1 lbs. of refrigerant to enter system, then close valves.

(NOTE: It is advisable at this time to leak test system for major leaks as described in Note 46.)

9. Purge system.
10. Repeat steps 4 and 5.
11. Repeat step 7.
12. System is now ready for complete charge of refrigerant as described in part d of this note.

d. Adding Refrigerant (Complete Charge)

1. Connect heating element plug to a 110 volt outlet.
2. Disconnect low refrigerant detection system at connector on right side of compressor, near valve cover.
3. Evacuate system as described in part c of this note. The system must be properly evacuated.
4. Fill cylinder on Charging Station with refrigerant as follows:

a. Open valves on refrigerant drum and bottom of cylinder (valve 4 must be closed).

b. Open valve on top of cylinder until proper liquid level is obtained in sight tube. (4 pounds on standard models, 5 1/4 pounds on Fleetwood Seventy-Five). Fleetwood Seventy-Five refrigerant will have to be added in two steps as required charge is greater than capacity of Charging Station cylinder.

5. Fully open valves 2 and 4 to allow refrigerant to flow into system.

(NOTE: If refrigerant does not flow freely into system, it is probably due to valve cores in high pressure line and STV fittings not being depressed far enough. If this condition exists, try another Gage Adapter, J-5420, or build up an adapter depressor tongue with solder to depress valve core further.)

6. After liquid refrigerant has stopped flowing into high pressure side of system, close valve 2.
7. Start engine and run at approximately 1500 rpm with transmission in PARK position.
8. Move Automatic Climate Control lever to AUTOMATIC position and set temperature dial to 65°F.
9. Open valve 1 (valve 4 must also be open). This will allow refrigerant remaining in cylinder to be pulled into system.
10. Shut off engine, close all valves, disconnect Charging Station high and low pressure lines and replace caps on fittings.
11. The system should not be overcharged due to excessive head pressures that result.

e. Adding Refrigerant (Partial Charge)

Refrigerant can be added to the air conditioning system using Charging Station, J-23500. The charging lines must be purged before any refrigerant is added.

1. Connect Charging Station as described in part b of this note.

(NOTE: Purge air from Charging Station high and low pressure lines before connecting. To purge lines, crack open valves 1, 2 and 4, making certain that there is some refrigerant in cylinder, then install lines and close valves.)

2. Disconnect low refrigerant flow detection system at connector on right side of compressor, near valve cover.
3. Operate engine at 600 rpm with transmission in PARK position.
4. Move Automatic Climate Control lever to AUTOMATIC position and set temperature dial to 65°F.
5. Fill cylinder on Charging Station with 2 to 3 pounds of refrigerant, as follows:

a. Open valves on refrigerant drum and bottom of cylinder (valve 4 must be closed).

b. Open valve on top of cylinder until proper liquid level is obtained in sight tube.

c. Close valve at bottom of cylinder.

6. Open valves 1 and 4. Watch sight glass until solid column of liquid appears, then close valves.

(NOTE: It is normal for some foaming to occur in sight glass with an outside air temperature at 70°F or below. (See note 43.)

7. After five minutes of operation, check sight glass again. If no bubbles appear, open valves 1 and 4 and add another 1/2 pound of refrigerant.
8. If bubbles appear, repeat steps 5 and 6.
9. Shut off engine, close all valves, disconnect Charging Station, and install gage fitting caps.
10. The system should not be overcharged due to excessive head pressures that result.

f. Adding Oil

The six-cylinder compressor uses 525 viscosity refrigeration oil. An oil charge of 10-1/2 fluid ounces is required, (13-1/2 fluid ounces on Fleetwood Seventy-Five models). It is important that only the specified type and quantity of oil be used in the compressor. If there is a surplus of oil in the system, too much oil will circulate with the refrigerant, causing the cooling capacity of the system to be reduced. Too little oil will result in poor lubrication of the compressor.

When it is necessary to replace a component of the refrigeration system or when the system is discharged at a rapid rate as described in part a of this note, certain procedures must be followed to assure that the total oil charge in the system is correct when the system is reactivated. When the compressor is operated, oil gradually leaves the compressor and is circulated through the system with the refrigerant. Eventually a balanced condition is reached in which a certain amount of oil is retained in the compressor and a certain amount is continually circulated. When the system is discharged at a rapid rate or a component of the system is removed after the system has been operated, some oil will go with it. To maintain the original total oil charge, it is necessary to compensate for this by adding oil to the new replacement part.

The procedures for adding oil are as follows:

1. Compressor Only

1. Idle engine for 10 minutes at 1000 - 1500 rpm at maximum cooling and high blower speed to allow oil to distribute itself in system in a normal manner.
2. Remove compressor from car and place it in a horizontal position with drain plug downward. Drain oil, measure, and discard it.
3. Drain oil from compressor that is to be installed in car.
4. If oil drained in step 2 is more than 4 fluid ounces, add to new compressor the same amount of oil as drained from replaced unit plus the amount lost during rapid discharge.
5. If the oil drained in step 2 is less than 4 fluid ounces, add 6 ounces of oil to new compressor, plus the amount lost during rapid discharge.

2. Replacing Components

Whenever replacing a component of the air conditioning system, measured quantities of 525 viscosity refrigeration oil should be added to the component to assure that total oil charge in system is correct before unit is operated.

Oil should be added to replacement components as indicated below.

Evaporator (front or rear)	Add 3 fluid ozs.*
Condenser	Add 1 fluid oz.*
Receiver	Add 1 fluid oz.*
Condenser and Receiver Assembly	Add 2 fluid ozs.*
*Plus the amount lost during rapid discharge.	

Oil should be poured directly into the replacement component. If an evaporator is installed, pour oil into inlet pipe with pipe held vertically so oil will drain into core.

If any other components, such as valves or hoses are replaced, no additional oil is necessary.

3. Compressor and Components

CAUTION: If system has been operated and there is evidence of a major loss of oil, system has probably lost all or most of its refrigerant. If any refrigerant remains, discharge it from system. Do not operate compressor any more than is absolutely necessary to avoid damage from lack of oil.

1. Remove compressor and place in a horizontal position with drain plug downward. Drain oil from compressor, measure it and then discard it. To promote draining, have suction connector open and tilt compressor as required.
2. Replace damaged component from which the oil was lost.
3. If more than 4 fluid ounces of oil was drained from compressor in step 1, add same amount of new oil to compressor, plus an amount to compensate for that in damaged component, as shown in the table.
4. If less than 4 fluid ounces of oil was drained from compressor in step 1, add 6 fluid ounces of oil, plus amount shown in the table for component being replaced.

45. Leak Testing Refrigeration System

There are three methods that may be used for detecting leaks in the air conditioning system. The use of a leak detector fluid, a torch type leak detector or an electronic leak detector is recommended.

a. Leak Detector Fluid

Leak detector fluid (mixed with water per directions on bottle) may be used by daubing or squirting the liquid around joints to be tested. Ordinary leaks will form a cluster of bubbles almost immediately. Extremely small leaks will form a white foam which will materialize with a time limit from a few seconds to a minute, depending on size of leak.

In order to locate leaks with this fluid, it is essential that you see all of the surfaces you are checking with a good light; otherwise small leaks could easily be overlooked.

b. Torch Type Leak Detector

Detecting a leak with the torch type detector is accomplished by observing the color of the flame in the head of the detector, when the sampling tube is close to a refrigerant leak.

The flame can be described as three different colors: green, blue, and purple. Green indicates a small leak, blue indicates a medium leak and purple indicates a large leak.

WARNING: WHEN LEAK TESTING, AVOID INHALING FUMES OR GAS FROM DETECTOR TORCH. THEY MAY BE TOXIC AND CAUSE DAMAGE TO THE LUNGS IF INHALED. IT IS ALSO RECOMMENDED THAT A FIRE EXTINGUISHER BE CLOSE AT HAND WHEN USING THE LEAK DETECTOR TORCH.

To operate unit, open valve until a low hiss of gas is heard, then light the flame at opening in detector chimney. Adjust flame until blue flame is approximately 3/8 inches above reaction plate to make detector as sensitive as possible for small leaks.

When checking for leaks, always position sampling tube below fitting or area to be tested, as refrigerant 12 is a heavy vapor and will sink when exposed to air.

It is best to test low pressure side of system at drum pressure which is much higher than normal low side operating pressure.

In testing high pressure side for leaks, run system for a few minutes to build up pressure in high pressure side of system. Then stop engine and test high pressure side of system for leaks.

Do not attempt to leak test with the engine running in a drafty location as it will disperse the refrigerant 12 and be impossible to locate a leak.

c. Electronic Leak Detector

Two types of electronic leak detectors are recommended: the more recently available Refrigerant Gun, J-23400; and Electronic Leak Detector, J-22235. Instructions for their use are included with the equipment.

46. Cooling Capacity Performance Test

The following procedures pertain to all models except Fleetwood Seventy-Five. Performance Tests for the Fleetwood Seventy-Five Air Conditioning Systems are explained in Note 50.

a. Performing Test

1. Connect gage set high and low pressure lines, Fig. 1-101.
2. Hook up tachometer.
3. Disconnect vacuum hose to vacuum motor and plug hose or connect tester J-23678 and set for max. A/C.
4. Locate auxiliary fan 24" in front of condenser (12" in front of grille).
5. Place humidicator, J-6076, in auxiliary fan air stream in front of car.
6. Open both front doors.
7. Open all A/C outlets.
8. Insert a calibrated thermometer in righthand outlet, (J-22555)

(NOTE: Sensing bulb should not touch metal or plastic.)

9. Set A/C control lever to "Auto".
10. Place shift lever in "Park" and apply parking brake.
11. Start engine and set to run at 2,000 RPM.
12. Lower hood carefully to lowest position possible. Do not pinch or damage gage set hoses.
13. Allow engine to run for 10 minutes.
14. Record readings of:

a. Ambient dry bulb, which gives the temperature in front of the condenser.

b. Ambient wet bulb, which determines the humidity.

c. High and low side pressures.

d. Air temperature at right hand outlet.

b. A/C Test Conclusions

The discharge temperature should agree with the value shown on the Discharge Air Temperature Chart, left side of Fig. 1-104 within ± 3°F.

The high pressure should agree with the value shown on the High Side Pressure Chart within 25 psi, right side of Fig. 1-104.

The low side pressure should be 29.5 ± 5 psig in

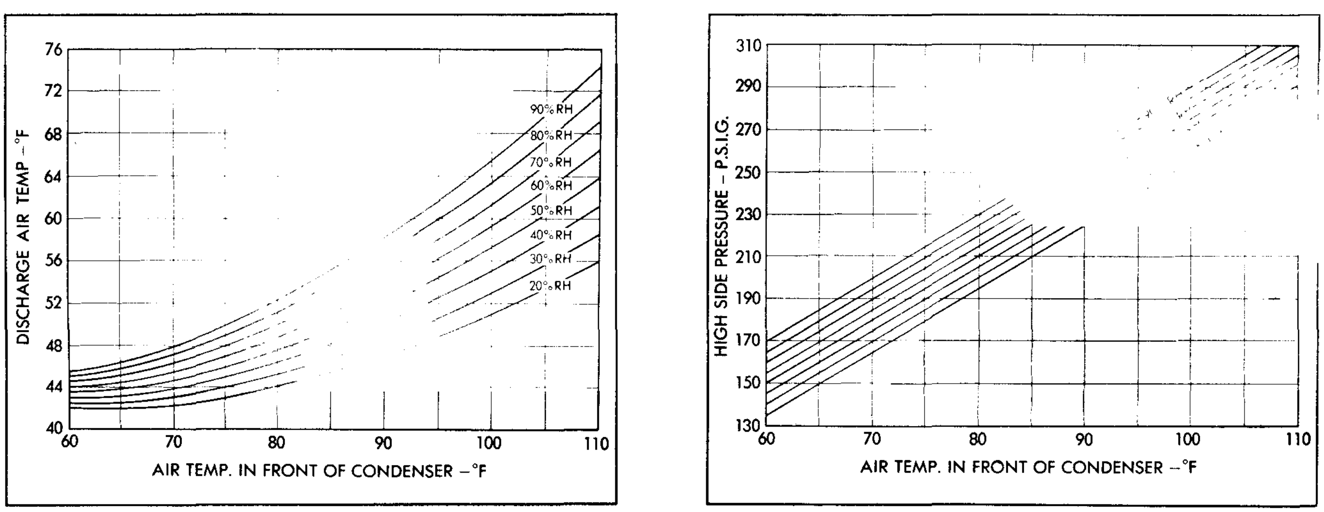


Fig. 1-104 A/C Performance Test (Except 6F)

all cases, except where ambient temperature and humidity are extremely high.

If these conditions are not met, refer to the diagnosis section.

47. Control System Functional Test

The following procedure is used to assure correct functional operation and requires approximately two minutes to perform. The system is to be tested at room temperature with the hood down, the doors and windows closed and the engine operating. Engine coolant must be warm. Proceed as follows:

1. Operate car at 1000 RPM or better.
2. Place A/C outlets in wide-open position.
3. Install thermometer in center A/C outlet.
4. Set control lever at "DEF" and temperature dial at 85°.
   a. Air should be delivered out of the defroster outlets.
   b. Blower should operate at high speed.
   c. Some air should come out heater outlet.
5. Set lever at "BI-LEVEL" and temperature dial at 75°.
   a. Air should be delivered from both the A/C and heater outlets.
   b. Blower should operate at a lower speed.
   c. Small airflow should come from defroster outlets.
6. Set lever at "HI" and temperature dial at 65°.
   a. Cool to cold air should be delivered from A/C outlets.
   b. Blower should operate at high speed.
   c. Recirc air door should open (will be slightly noisy).
7. Set lever at "AUTO" and temperature dial at 65°.
   a. Recirc door should close – noise level will drop (except Eldorado).
   b. After 45 seconds, discharge air temperature should be 50°F or lower (may be slightly higher in 90°F or above ambient).
8. Set lever at "AUTO" and temperature dial at 85°.
   a. Blower speeds should drop (Hi - M_3 - M_2 - M_1 - etc.)
   b. Discharge air temperature should increase.
   c. Air delivery may change from A/C outlets to heater outlet - depending upon ambient temperature.
9. Set lever at "LO" and temperature dial at 85° Air should be delivered at fixed low blower.
10. Set lever at "VENT" and temperature dial at 85°.
    a. Air discharge should be from A/C outlets.
    b. Blower should operate at fixed Lo speed.
    c. A/C compressor should not operate.
11. Set lever at "OFF" and temperature dial at 65°
    a. Air discharge should be from heater outlet.
    b. Blower should operate at fixed Lo speed.
    c. A/C compressor should not operate.

48. Component Adjustments

Be sure to allow sufficient time for the car engine to "warm up" and for the system to "turn-on" before attempting calibration. Do not skip any steps in the Calibration Procedure.

a. Temperature Dial Calibration

1. Connect the ATC Tester J-23678 into the wiring harness and the programmer.
2. Place the control head selector lever in the "VENT" position.
3. Place the "MANUAL-AUTOMATIC" switch on the tester in the "MANUAL" position.
4. Place the "TEMPERATURE DIAL CALIBRATOR" switch on the tester in the "CALIBRATE" position.
5. Note the voltmeter reading.
6. Press the "CALIBRATE" button and note the voltmeter reading.
7. With the "CALIBRATE" button pressed in, rotate the temperature dial on the control head until the voltmeter reading is the same as it was in Step 5 (when the button is not pressed in).
8. The temperature dial should be set at the temperature dial setting on the Tester panel. If it does not, use tool #J-21530 to hold the gear on the left side of the temperature dial and slip the temperature dial to the correct setting, Fig. 1-105. If the temperature dial cannot be calibrated using this procedure, it is defective.

b. Mix Door Link Adjustment

1. Loosen the hex screw of the door link at the output shaft of the programmer, Fig. 1-106.
2. Place the control head selector lever in the "DEF" position.
3. Remove the electrical connector from the programmer. This results in the proper position of the output shaft of the programmer (full heat position).
4. Check to make sure that the air mix door is in the full heat position. The blower air flow will now hold the mix door in the proper position.
5. Without disturbing the door link or the output shaft position, tighten the hex screw on the door link, Fig. 1-106.
6. Check the Mix Door Link Adjustment.

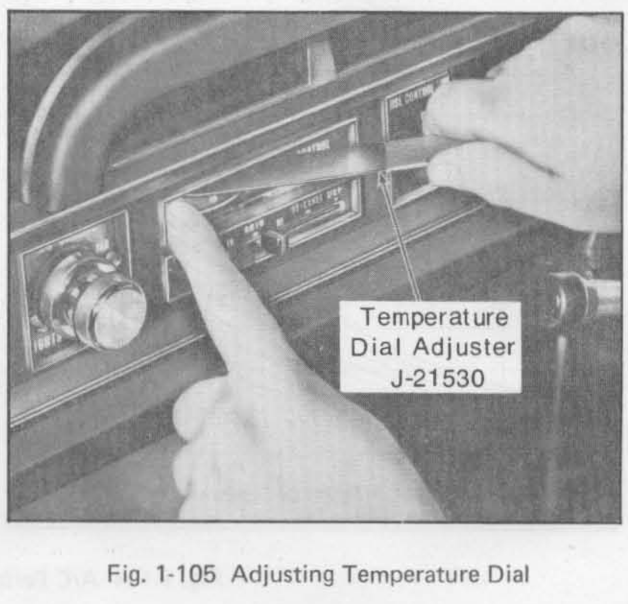


Fig. 1-105 Adjusting Temperature Dial

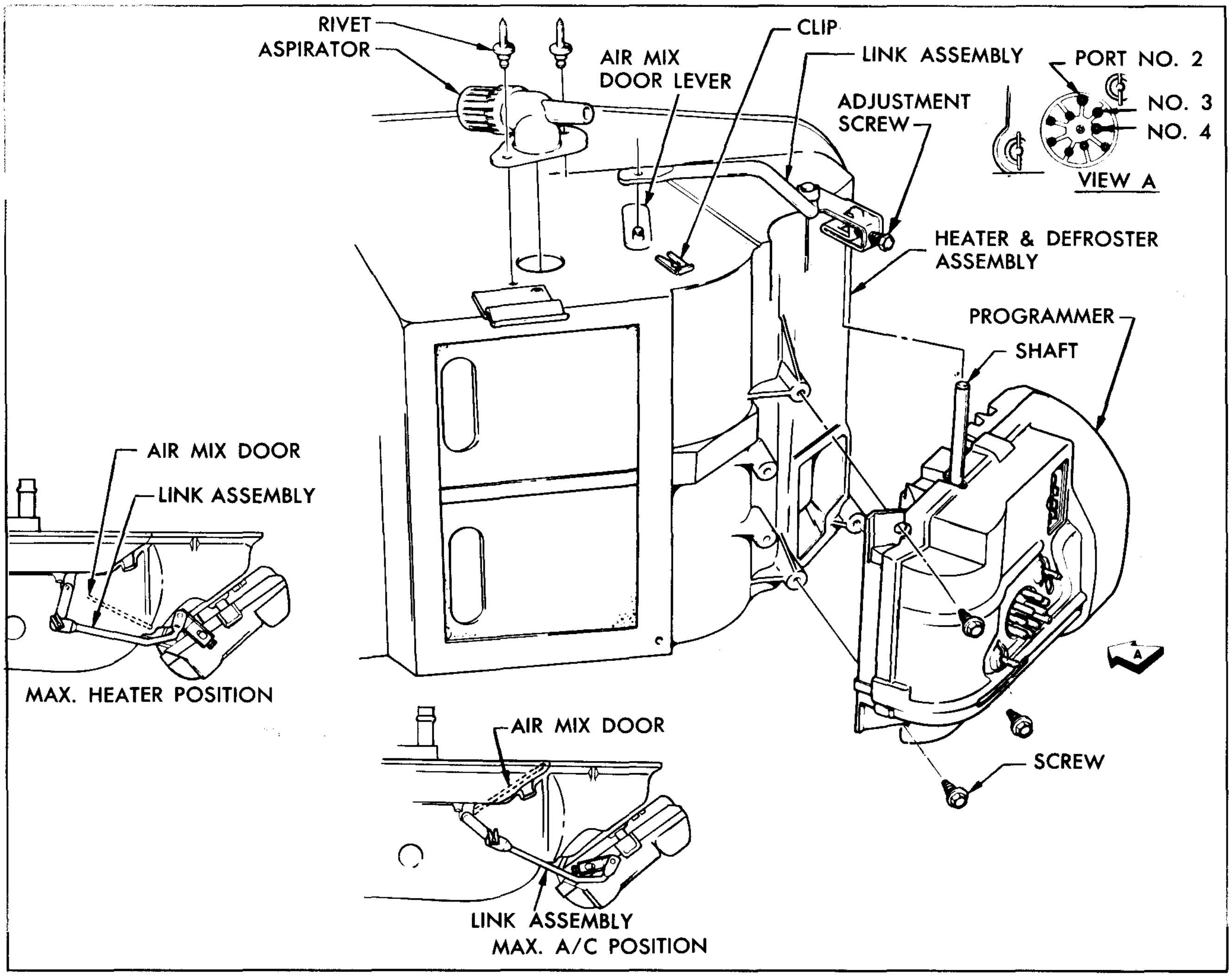


Fig. 1-106 Programmer Installation and Adjustment

a. Connect Tester J-23678 into the wiring harness and the programmer. Place the control head in "AUTO". Place the "MANUAL-AUTOMATIC" switch in the "MANUAL" position. Using the "MANUAL CONTROL", swing the programmer to "Max. Heat" then to "Max. Cold". Hi blower should be obtained in both positions.

b. Check for recirculation operation. Operate the system with the "MANUAL CONTROL" on "150" for 5 minutes so the restricted vacuum line can move the outside air door to the outside air position. With the control head in "HI", move the "MANUAL CONTROL" to "Max. Cold". With all the car doors and windows closed, the blower noise level should increase when recirculation occurs (approximately 3 minute delay due to the restrictor).

c. Programmer Amplifier Calibration (Feedback "Pot" Adjustment)

1. Remove the plastic cover from the programmer while it is still mounted in the car.

2. Connect the Tester J-23678 into the wiring harness and the programmer.

3. Place the control head selector lever in the "AUTO" position.

4. Place the "MANUAL-AUTOMATIC" switch on the tester in the "MANUAL" position.

5. Place the "TEMPERATURE DIAL CALIBRATOR" switch of the tester in the "OFF" position.

6. Rotate the "MANUAL CONTROL" knob on the tester to the "Max. Heat" position. The programmer should move to the full heat position.

7. Rotate the "MANUAL CONTROL" knob to 180 and STOP. DO NOT OVER-TRAVEL!

8. Using a blade type screwdriver, slip the shaft of the feedback potentiometer fully counterclockwise to its stop (see figure 1-100 for location of the feedback potentiometer in the programmer). The vacuum motor mechanism will be "in" the vacuum motor indicating full heat operation.

9. Using the screwdriver, very slowly slip the feedback potentiometer clockwise until the first movement of the vacuum motor mechanism can be seen. Stop the adjustment when the movement first occurs. (Do not watch the programmer output shaft.)

10. To check the adjustment, rotate the "MANUAL

CONTROL" knob to the "Max. Heat" position. Then slowly rotate the "MANUAL CONTROL" knob counterclockwise and the vacuum motor mechanism should first start to move when the "MANUAL CONTROL" knob is exactly at 180 ± 1. Touch up the feedback potentiometer adjustment in the programmer so that the mechanism movement occurs exactly 180. If this adjustment cannot be made, the programmer is defective.

d. Compressor Drive Belts

The compressor drive belts are adjusted at the power steering pump. Follow procedure described in Section 6, Note 9.

THEORY OF OPERATION FLEETWOOD SEVENTY-FIVE AIR CONDITIONER

Two separate air conditioning systems are used in the Fleetwood Seventy-Five Cadillac. In each system automatic temperature control is provided. The front compartment system utilizes the same components and operates in the same manner as the air conditioner on all other 1973 model cars, with the following exceptions:

The front system refrigerant and heater water hoses have "tee" connections incorporated to provide feed to the rear system.

The rear compartment system utilizes a series-flow, reheat-type evaporator, heater and blower assembly, located on the axle kickup shelf in the trunk compartment. This assembly draws car interior air from the rear compartment through the package shelf, cools and reheats it as required, and discharges it into the passenger compartment through overhead roof ducts or through duct-work and grilles in the rear doors. When the system operates in heater mode, a portion of the heated air is directed at the rear window through grilles in the package shelf for defrosting purposes.

A complete string of sensors, an amplifier, a transducer, a power servo and other temperature control components are utilized in the rear system. A description of these follows.

Automatic Climate Control Components (6F Rear) (Fig. 1-107 and Fig. 1-108)

a. Sensors

The in-car sensor, mounted in a grille located on the rear package shelf, senses the temperature of the passenger compartment as well as the sun load on the rear of car.

The duct sensor senses the discharge air temperature. It is located in the mode door assembly on the right side of the car where it is exposed to all discharge air entering this area.

The ambient sensor is located with the ambient sensor for the front system on the top of the evaporator case. It senses the temperature of the ambient air entering the system.

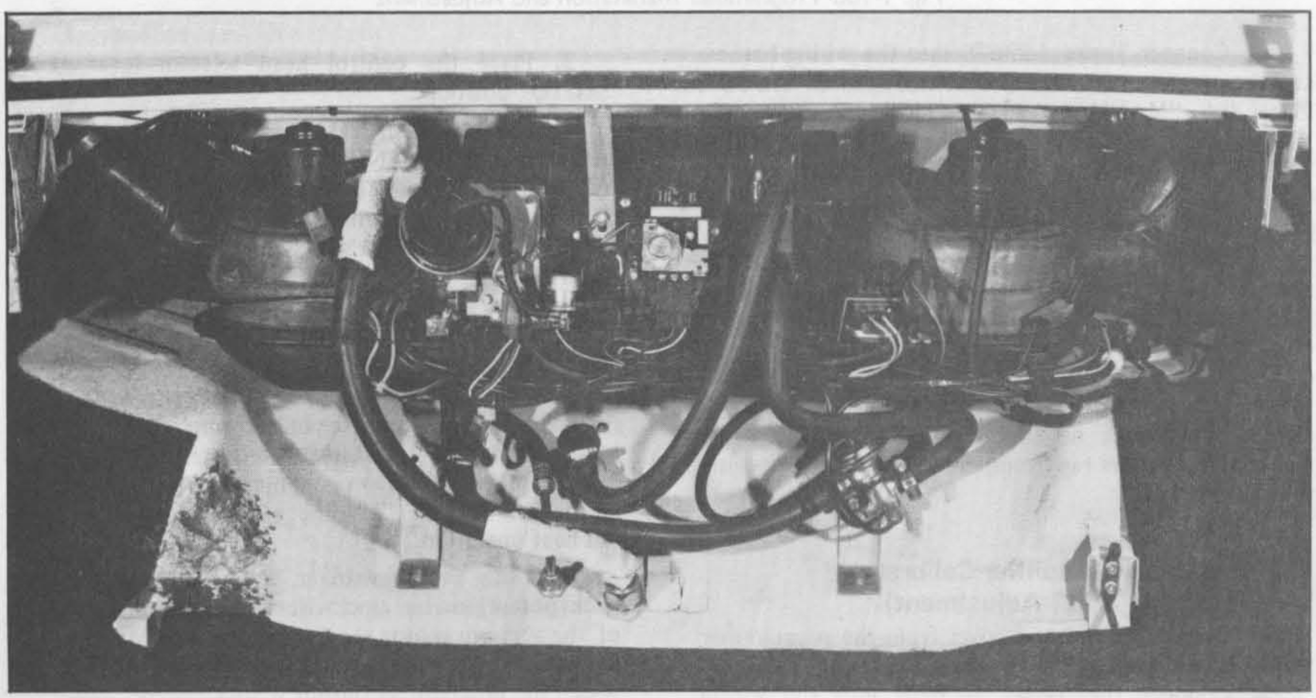


Fig. 1-107 6F Rear Unit On Car

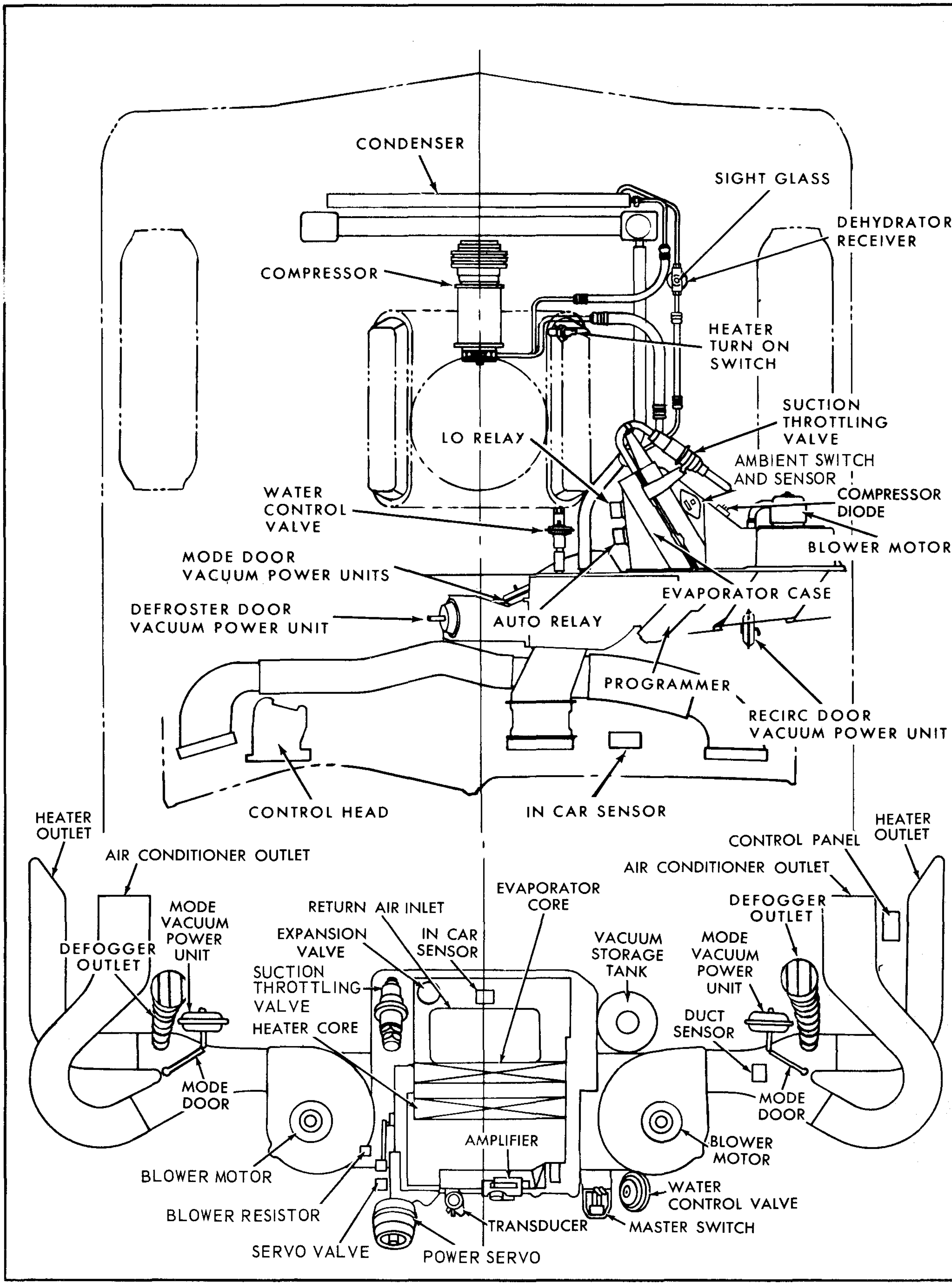


Fig. 1-108 Location of 6F A/C Units

b. Temperature Dial

The temperature dial is located in the right rear quarter panel trim. The dial is graduated in 5°F divisions to allow the passenger to select any temperature in the 65°F to 85°F range.

c. Vacuum On-Off Switch

The Vacuum On-Off switch is located with the temperature dial in the right rear quarter panel trim. This switch allows the passenger to turn the rear system off.

d. Amplifier

The amplifier is mounted on the rear face of the rear unit case assembly in the trunk.

e. Transducer

The transducer for the rear assembly is mounted on the rear face of the case assembly just to the left of the amplifier.

f. Power Servo

The power servo is mounted on the left vertical surface of the case assembly.

Suction Throttling Valve (6F Rear) (Fig. 1-10)

The pilot operated absolute suction throttling valve is located on the left front side of the evaporator assembly, in the low pressure line to the compressor. The valve body contains two ports; the evaporator gage port on the inlet side of the valve, and a port on the outlet side for the external equalizer line.

This valve works in the same manner as that used on front systems, but is calibrated to control the rear evaporator pressure to 27 psi.

Expansion Valve (6F Rear)

An expansion valve is used in the rear system to perform the same function as the valve used in the front system. The rear expansion valve is contained within the evaporator case on the lower left front side.

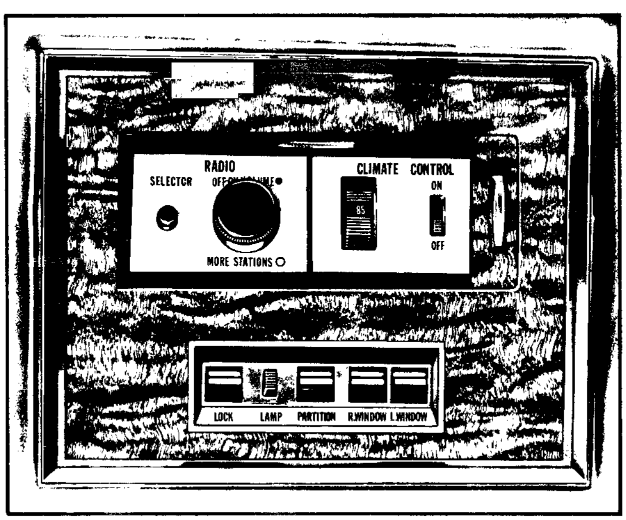


Fig. 1-109 Control Panel - 6F Rear Unit

Evaporator (6F Rear)

The evaporator used on the rear system is smaller and of different construction than that used in front systems. The rear evaporator is located in the case assembly in the luggage compartment under the package shelf.

Blower Assemblies (6F Rear)

Two blower assemblies are used on the rear system. Air from the heater air conditioner assembly is drawn into blower assemblies on either side of the case and then expelled into the car.

Control Panel (6F Rear)

The control panel, (Fig. 1-109), located in the right rear quarter panel trim, consists of a temperature dial and an ON-OFF switch. The temperature dial is graduated in 5 degree divisions from 65°F to 85°F. This dial is used to select the desired temperature. The ON-OFF switch controls vacuum feed to the rear system and is used to turn the system On or Off.

Vacuum Circuit

The Automatic Climate Control system incorporates two basic vacuum circuits. The first circuit controls the position of the power servo unit, and the second circuit controls the operation of the various vacuum operated components of the system.

The vacuum feed to the rear system is through a 1/4" rubber hose connected near the neutral switch at the left side of the instrument panel. The hose travels up along the center vent duct to the right-hand side of the car and then along the floor down the right-hand side of the car to a tee located at the rear of the rear A/C unit. One leg of the tee feeds vacuum to the vacuum storage tank which, in turn, connects the transducer and the power servo vacuum diaphragm. The other leg of the tee feeds vacuum to a check valve, the customer "On-Off" switch, and the power servo vacuum valve.

To trace the path of the vacuum, refer to the servo valve connections (Fig. 1-110) and to rear automatic climate control vacuum schematic (Fig. 1-111).

Operation

a. Off

(NOTE: For the purpose of this discussion, assume the control switch is in the Off position, and the engine is running.)

Whenever the engine is operating, the sensor string is transmitting a signal to the amplifier. The signal is converted to a proportionate DC voltage by the amplifier, and is fed to the transducer. The transducer converts the electrical signal to a proportionate regulated vacuum output that is supplied to the vacuum power unit of the power servo, thus placing the power servo unit in the proper operating position, if the system were to be started.

b. Maximum Cooling

(NOTE: For the purpose of this discussion: assume

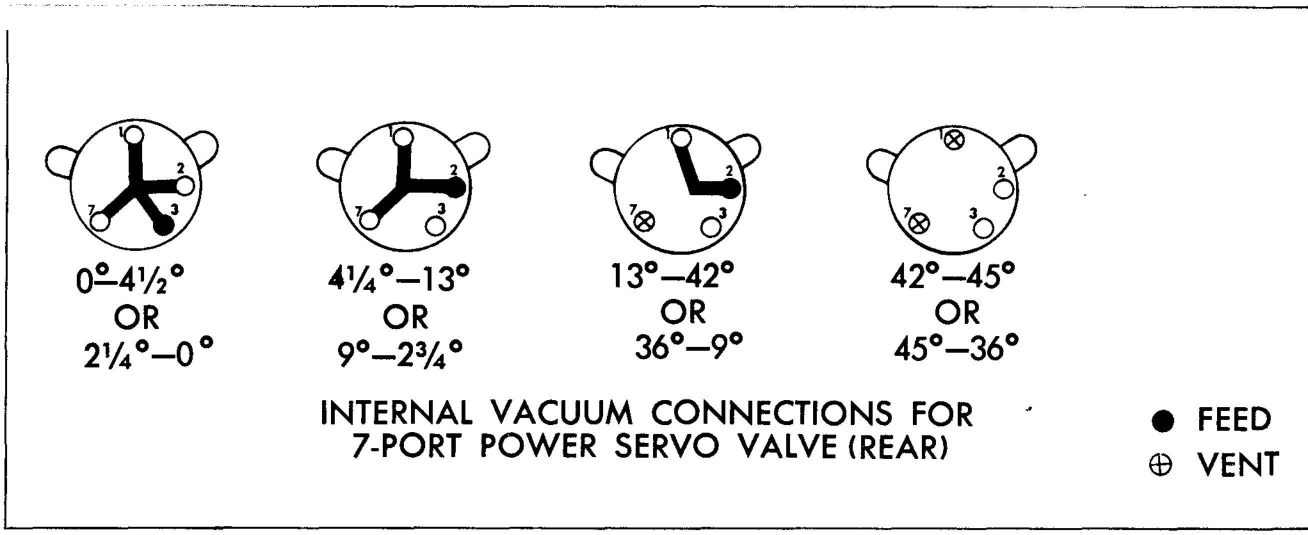


Fig. 1-110 Rotary Valve Internal Connections - 6F Series

the ambient air temperature is 90°F, the in-car temperature is 90°F, the temperature dial rheostat is set at 75°F, and the engine is running.)

Due to the high temperatures acting on the sensors, the resistance values of the sensors will be low, causing a strong signal to the amplifier. The output of the amplifier is high, and is being fed to the transducer, where it is converted to a weak vacuum output, causing the power servo to be in the maximum air conditioning position.

When the switch is placed in the "ON" position, vacuum is fed to the master switch, completing the electrical circuit to the blower motor and compressor, and to the servo vacuum valve. In the maximum air conditioning position, the servo valve performs the following vacuum functions:

The mode doors are moved to the air conditioning

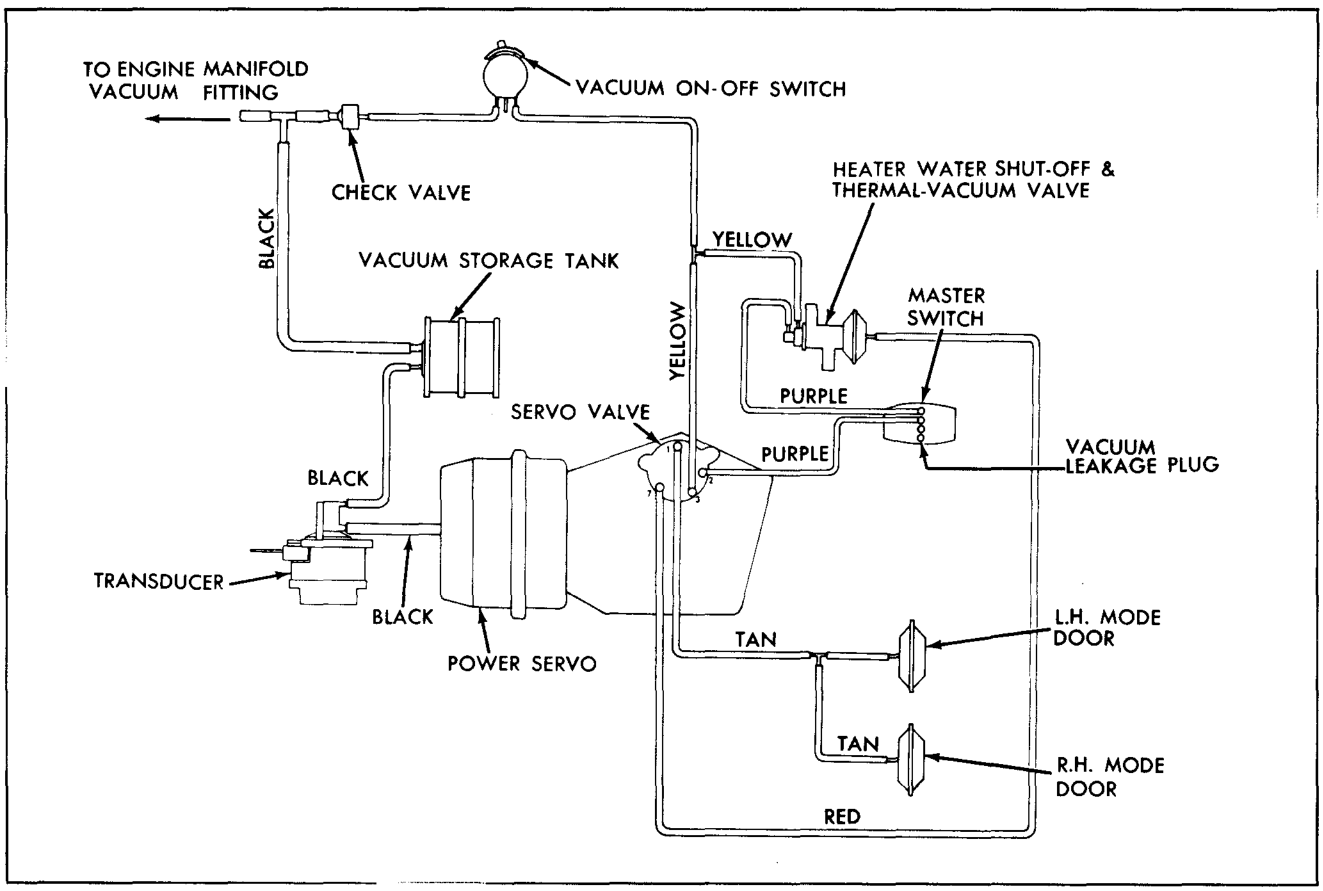


Fig. 1-111 Rear A/C Vacuum Schematic

position, allowing the discharge air to be discharged through the air conditioner outlets. The water control valve is closed, preventing the flow of engine coolant to the heater core.

In addition, the power servo has placed the temperature door in the maximum cooling position, preventing any air flow through the heater core. The blower is operating at HIGH speed.

As the system operates the in-car and duct sensors, sensing the lowering temperatures, increase in resistance, causing more vacuum to be fed to the power servo unit. The power servo then performs the necessary events, in the proper sequence, Fig. 1-112, until such time as the system reaches a balanced position to hold the interior temperature to the dial setting.

As the vacuum supplied to the power servo vacuum power unit increases, the position of the operating arm and the servo vacuum valve changes. The blower decreases to M2 speed. Vacuum to the hot water valve is cut off, causing the hot water valve to pass engine coolant.

As the system continues to modulate, the blower will decrease to M1 speed and then the position of the temperature door will change to allow the entry of heated air that will mix with the cooled air. Continued modulation by the system can decrease the blower to LOW speed. The system will modulate itself to maintain the interior temperature, regardless of any change in the ambient air temperature.

If the ambient air temperature were to fall quite rapidly, the ambient sensor resistance value would increase, causing a weaker voltage signal to be sent to the transducer. The power servo unit would move towards the heater position as the vacuum output from the transducer was increased. The system would switch into the heater mode and the blower speed would increase to M1, then M2, and HIGH. During the increase of blower speeds, the temperature door would be traveling toward the maximum heat position and eventually would prevent all cold air from entering the system.

c. Maximum Heat

(NOTE: For the purpose of this discussion, assume the ambient air temperature is 0°F, the in-car temperature is 0°F, the temperature dial is set at 75°F, and the engine is running.)

Power Servo Arm Angle		Event
Increasing Vacuum	Decreasing Vacuum	
4-1/4°	2-3/4°	A/C Over Ride Begin - End
13°	9°	Water Control Valve Close - Open
42°	36°	Change Mode A/C - Heat

Fig. 1-112 Sequence of Events - 6F Series

Due to the low temperatures acting on the sensors, their resistance values will be high, causing a weak signal to the amplifier. The output of the amplifier is low, and is being fed to the transducer, where it is converted to a strong vacuum output causing the power servo to move toward the maximum heat position.

In the heat mode, the vacuum circuitry is such that the vacuum must pass through the thermal vacuum valve in order to actuate the master switch. The compressor clutch circuit is held open by the ambient switch in the front unit any time it is below 32°F.

Once the engine coolant has reached the temperature of approximately 140°F, vacuum flows through the thermal vacuum valve, causing the outside air door to open and the blower to operate at HIGH speed, admitting heated air into the car. The in-car and duct sensors sense the temperature rise and, as their resistance values lower, the system begins to modulate and the blower speeds will diminish to M2, M1 and then to LOW.

During the decrease in blower speeds, the temperature door would travel from the maximum heat position to a mid-position, blending heated and cooled air. If the outside air temperature were to rise to about 35°F, the compressor clutch circuit would close, causing compressor operation to begin. Continued temperature increases, sensed by the sensors, cause the system to move toward the air conditioning position.

Electrical Circuit (Fig. 1-113 and 1-114)

The Automatic Climate Control electrical circuit flows from the accessory terminal of the ignition switch to the 15 ampere fuse in the fuse block, and then to the amplifier, to the ambient sensor, and to the master switch.

The master switch sends current through the diode assembly, mounted behind the instrument panel, to energize the compressor clutch when the front unit ambient switch is closed. A compressor diode assembly is incorporated into the compressor circuit of the front and rear units on the Fleetwood Seventy-Five systems. The compressor diode assembly permits either unit to supply current to the compressor clutch without causing a feed back into the other system. A feed back from the front system into the rear system would cause the master switch to be overridden and the system's blower to operate even though the rear system was turned off. The compressor diode assembly is mounted on the front of the evaporator case.

The sensor string circuit current flows from the ambient sensor to the discharge air sensor, to the in-car sensor, and then to the amplifier.

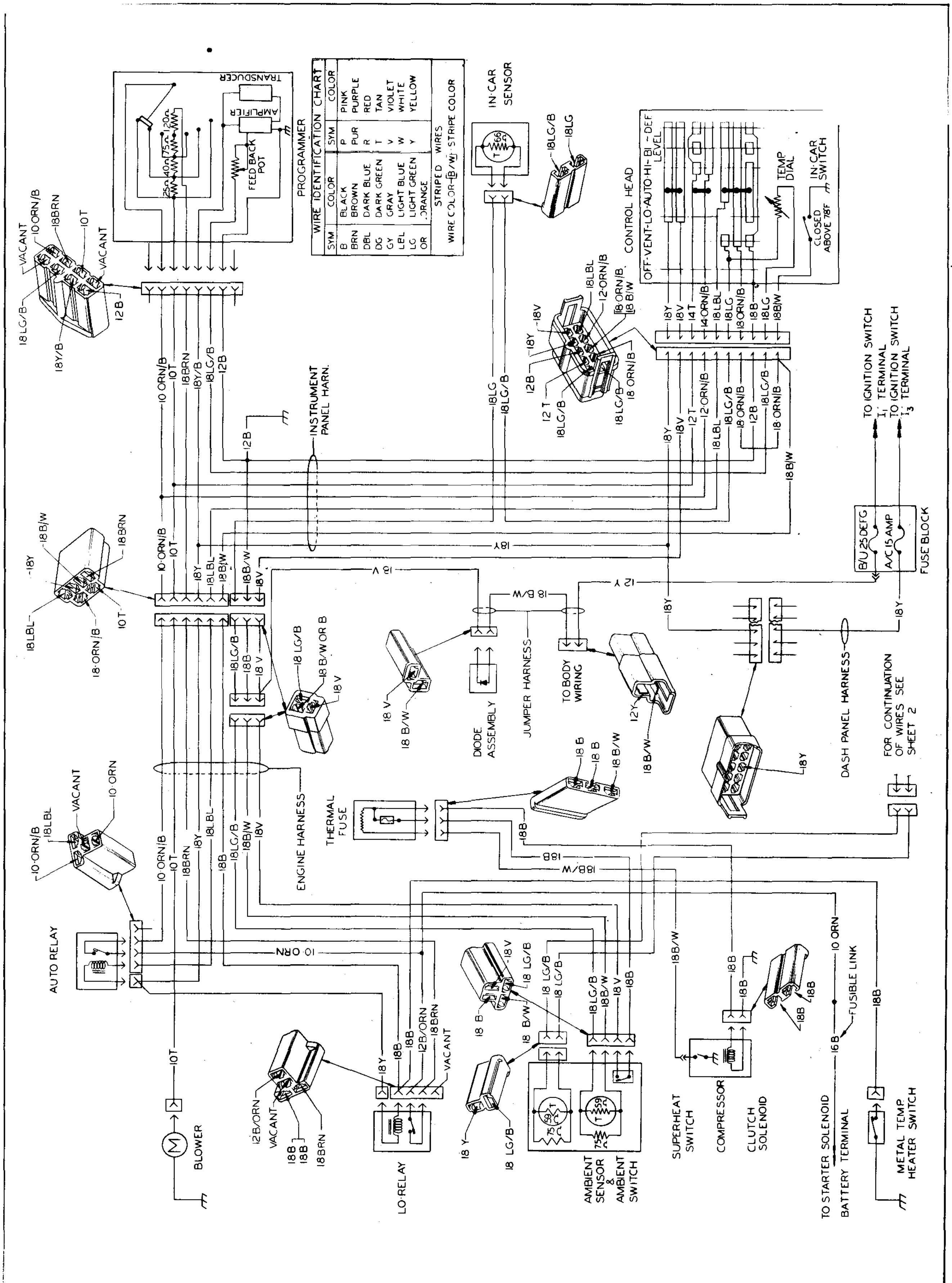


Fig. 1-113 Front A/C Circuit Diagram

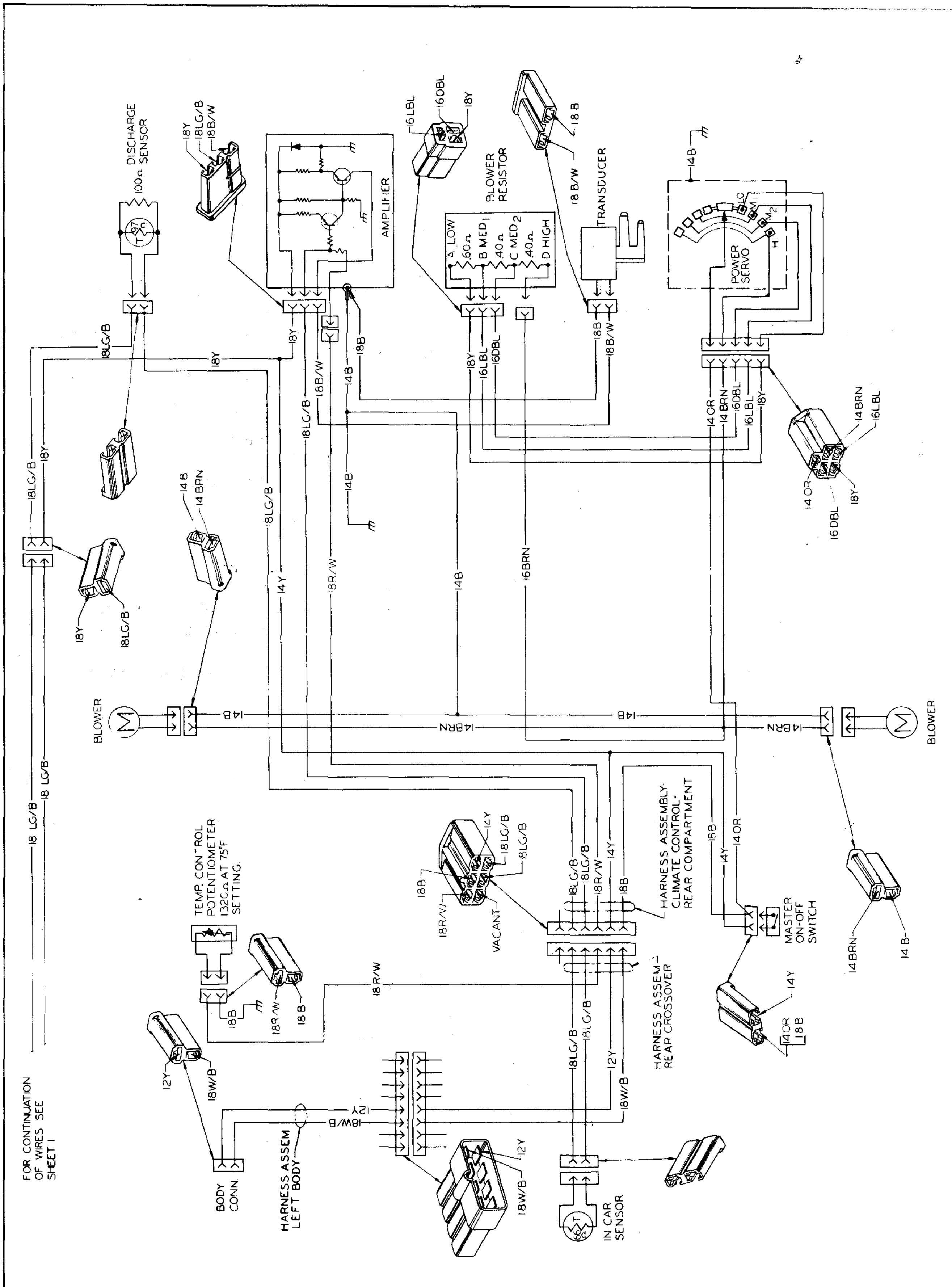


Fig. 1-114 Rear A/C Circuit Diagram

SERVICE INFORMATION
FLEETWOOD SEVENTY-FIVE AIR CONDITIONER

49. Adjustments (6F Rear)

a. Temperature Door Link

1. Loosen temperature door adjusting link screw.
2. Apply vacuum to power servo vacuum power unit.
3. Tighten temperature door adjusting link until head of screw contacts link then continue to tighten just enough to take play out of link.

b. Temperature Dial

(NOTE: If system is working properly, perform temperature dial test as described in Notes 52a, step 6, 52b, step 7, or 52c.)

Although the temperature dial may be operating correctly, it may be necessary to change the temperature dial setting for customer satisfaction. If an owner indicates a particular temperature dial setting where he is most comfortable, set temperature dial to that setting and proceed as follows:

1. Insert Temperature Dial Adjuster, J-21530, between temperature dial and casting. (Refer to Fig. 1-106.)
2. Turn dial to proper setting as determined by test procedure used.

50. Performance Test (6F Only)

To determine the efficiency of the Fleetwood Seventy-Five Air Conditioning system, run a performance test as outlined below:

1. Place transmission in PARK and start engine.
2. Check operation of controls by rotating temperature dials from stop to stop.
3. Turn off engine.
4. Purge high and low pressure lines on Charging Station J-8393.
5. Connect Charging Station high pressure line to fitting on high pressure vapor line, and low pressure line to evaporator gage fitting on suction throttling valve.
6. Disconnect vacuum hoses from both power servo vacuum power units and plug hoses.
7. Close hood as far as possible without pinching lines.
8. Place auxiliary fan (approximately 24 inch dia. blades) 24 inches from front bumper and direct air stream to center of radiator grille.
9. Place thermometer in air stream between auxiliary fan and radiator grille. Thermometer bulb must not contact any metal.
10. Place another thermometer in right front air conditioning outlet grille. Thermometer bulb must not contact any metal.
11. Open all doors and windows.
12. Use Humidicator, J-6076, to obtain simultaneous temperature and relative humidity readings of air entering air intake grille as follows:
    a. Shake thermometer down to settle red and blue columns in bottom of tubes.
    b. Throughly moisten wick on blue thermometer with water.
    c. Place humidicator on right hand side of cowl air intake grille so that entering air passes over bulbs of thermometer.
13. Place thermometer in right rear roof outlet and open deflector doors.
14. Place another thermometer on center of package shelf over return air intake.
15. Turn on auxiliary fan.
16. With transmission in PARK, start engine and operate at 2,000 rpm.
17. After five minutes, record:
    a. Humidicator red and blue bulb readings. (Red bulb reading is temperature of air entering air intake grille.)
    b. Temperature of air being discharged through right front air conditioning outlet.
    c. Temperature of air entering grille.
    d. Head pressure.
    e. Front evaporator pressure.
    f. Temperature of air being discharged from right rear outlet.
    g. Temperature of air returning to rear evaporator assembly.
18. Turn off engine and auxiliary fan.
19. To determine relative humidity of air entering air intake grille, position inner scale of humidicator so that blue (wet bulb) temperature is opposite red (dry bulb) temperature. Relative humidity is indicated by humidity arrow. Record relative humidity.
20. Refer to Chart C, Fig. 1-115 to determine if outlet air temperatures are normal. If outlet temperatures are the same or below reading on chart, operation is normal.
21. Refer to Chart D, Fig. 1-115 to determine if head pressure is normal. If head pressure is within 30 pounds below reading on chart, operation is normal.
22. Disconnect Charging Station.
23. Install vacuum hose on power servo vacuum power units after unplugging.

51. Connecting Automatic Climate Control Tester

The Automatic Climate Control Tester, J-21512, and the Automatic Temperature Control Tester, J-22368-01,

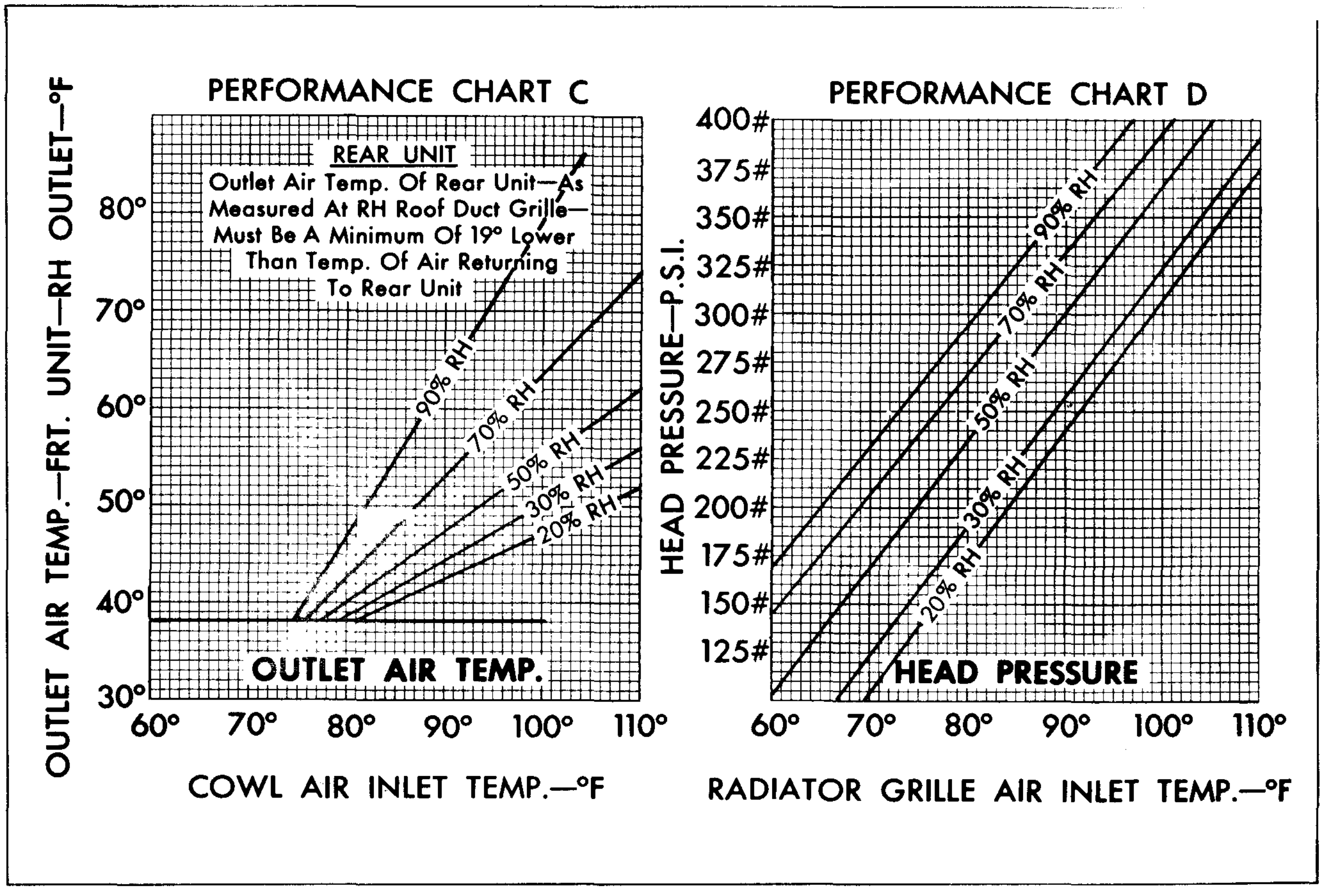


Fig. 1-115 A/C Pefrormance Chart

are used to isolate an electrical malfunction in the Automatic Climate Control system by serving as a substitute for components of the system. To use:

1. Remove trim panel inside luggage compartment.
2. Disconnect three-way connector from amplifier.
3. Connect three-way electrical connector of tester -- the one with three female terminals -- to amplifier terminal.
4. Connect second multiple connector of tester to car wiring harness.
5. Connect ground lead to car body.
6. When using J-22368-01, disconnect large vacuum hose at transducer and insert tester tee in vacuum line.

52. Testing Automatic Climate Control System

Two testers are available to perform these tests. Due to differences between the testers, two procedures are given in this note. Follow the test procedure that applies to the tester to be used.

a. Automatic Climate Control Tester, J-21412

This procedure is designed to assist servicemen in locating a malfunction in the Automatic Climate Control system, when the system turns ON, but operates only in maximum heat or maximum air conditioner at high blower speed. If the system is operating incorrectly, but does have some degree of self-modulation, first check adjustment of temperature dial as described in step 6. If system still performs incorrectly, proceed as follows:

(NOTE: For positive results, the Automatic Climate Control system should be tested in an area where the ambient temperature is between 70°F and 80°F. If the ambient temperature is below 70°F, the system may not produce full air conditioning, or if above 80°F, the system may not produce full heat.)

1. Preliminary Test

a. Place transmission in PARK and start engine.

b. Disconnect vacuum hose from power servo vacuum power unit, and seal hose with thumb. System and power servo should go to full air conditioning.

c. Connect a vacuum hose from vacuum supply line to power servo vacuum power unit. System and power servo should go to full heat. Reinstall vacuum hoses.

d. If system and power servo performed properly in stops b and c, proceed to step 2.

e. If power servo performed properly, but system did not, in steps b and c, proceed to step 5.

f. If power servo and system failed to perform properly, proceed to step g.

g. Check power servo and temperature door for binding or other mechanical interference. If no mechanical interference is found, replace power servo unit.

2. Sensor String Test

a. Turn engine off if still operating, and connect Automatic Climate Control Tester, J-21512, as described in Note 51.

b. Set temperature dial to 71° setting.

c. With transmission in PARK position, start engine.

d. Place Amplifier switch on Automatic Climate Control Tester, J-21512, in SENSOR position.

e. Place Sensor switch to A/C position, System and tester meter should go to full air conditioning.

f. Place Sensor switch in HTR position. System and tester meter should go to full heater.

g. If system did not perform correctly in steps e and f, proceed to step 3.

h. If system performed correctly, disconnect Automatic Climate Control Tester and reconnect car wiring harness. Visually inspect in-car sensor, replace if apparently defective, and check operation of system.

i. Check for loose connector at duct sensor and then at ambient sensor. If loose connector is found, repair and check operation of system.

j. If an ohmmeter is available, measure resistance value of ambient sensor, duct sensor and then in-car sensor. Sensor resistance value should approximate resistance value given in Fig. 1-54. Replace any defective sensor located. If no defective sensor is found, check car wiring.

k. If an ohmmeter is not available, substitute a known good ambient sensor, duct sensor, and then in-car sensor; check operation of system after each substitution. If system still fails to perform satisfactorily, check car wiring.

3. Amplifier Test

CAUTION: Sensor string must be tested before testing amplifier.

a. Place Amplifier switch on Automatic Climate Tester, J-21212, in AMPLIFIER position.

b. Turn Amplifier Control counterclockwise to stop. System and tester meter should go to full air conditioning.

c. Turn Amplifier Control clockwise to stop. System and tester meter should go to full heater.

(NOTE: If tester meter does not vary with variation in Amplifier Control, transducer or electrical circuit to transducer is defective.)

d. If steps b and c do not result in correct system operation, proceed to step 4.

e. If system operated properly in steps b and c, disconnect Automatic Climate Control Tester and reconnect car wiring harness to amplifier.

f. Disconnect red wire from temperature dial rheostat terminal on amplifier. With wire open, system should go to full air conditioning.

g. Ground red wire. System should go to full heat.

h. If system performed properly in steps f and g replace temperature dial rheostat.

i. If system failed to perform properly in steps f and g, replace amplifier circuit board.

j. If system fails to work properly after replacing amplifier circuit board, check car wiring.

4. Regulated Vacuum Test

(NOTE: Automatic Climate Control Tester, J-21512, should still be plugged in and engine should be running.)

a. Connect a vacuum gage to transducer vacuum input hose. Gage should read above 14 inch Hg. If not, locate and correct vacuum failure.

b. Reconnect vacuum input hose and connect vacuum gage to transducer output fitting, using a length of vacuum hose.

c. Make certain that temperature dial is at 71° setting.

d. Place Amplifier switch on Automatic Climate Control Tester, J-21512, in SENSOR position. Turn sensor switch to MID position and rotate temperature dial until tester meter needle reads on set line. Vacuum gage should read between 3.5 inch Hg. and 7.2 inch Hg. If not, replace transducer.

e. Rotate temperature dial to 65° setting. Vacuum gage should read 1.5 inch Hg. or less. If vacuum reading is lower, turn Sensor switch to A/C position, gage should now read 1.5 inch Hg. or less. If not, replace transducer.

f. Repeat step d.

g. Rotate temperature dial to 85° setting, vacuum gage should read 10 inch Hg. or more. If vacuum reading is lower, turn Sensor switch to HTR position, gage should now read 10 inch Hg. or more. If not, replace transducer. Check car wiring.

h. Rotate temperature dial to 71° setting and place Amplifier switch in AMPLIFIER position. Rotate tester Amplifier control from stop to stop. Output of transducer should vary between 1.5 inch Hg. or less, to 10 inch Hg. or more within 10 seconds. If not, replace transducer.

5. System Vacuum Test

a. Tee in a vacuum gage to any nipple of the master switch, and position vacuum gage so that it can be read from the seat.

b. Set the temperature dial to 71° and start engine. Vacuum gage should read above 14 inch Hg. at idle and stay at this setting throughout the check.

c. Slowly rotate temperature dial to 85°, and then back to 65°. If the temperature dial is rotated too rapidly, the vacuum may drop to 9 inch Hg. or so, but it should return to the original setting. This is a normal condition. However, if a vacuum leak is present, the vacuum reading will drop to 6 inch Hg. or less and remain there.

(NOTE: It is possible that a vacuum leak may show up only at a particular setting of the temperature dial. Therefore, whenever the vacuum drops, immediately stop rotating the dial until you are certain whether a leak is present or whether you were turning the dial too fast.)

d. Rotate temperature dial back to 71° except in OFF position, where there should be no vacuum reading.

e. If a vacuum leak is present, determine when it is present. Then, referring to Figs. 1-85 and 1-86 determine what valves, hoses and vacuum power units are involved to locate leak.

6. Temperature Dial Test with Automatic Climate Control Tester, J-21512.

(NOTE: This test can be made only when the system is operating properly.)

a. Place Amplifier switch in SENSOR position.

b. Place Sensor switch in MID position.

c. Adjust temperature dial until tester meter reads on SET line. Temperature dial should read 71°

d. If temperature dial does not read 71°, adjust dial as described in Note 47b.

7. Shut off engine and remove Automatic Climate Control Tester from system and connect car wiring harness to amplifier connector.

8. Intermittent Conditions

a. Connect the positive lead of an accurate voltmeter to the transducer wire at the transducer connector. Ground the negative lead to the car body.

b. Allow system to operate and stabilize.

c. Tap the sensors, temperature dial and amplifier. A severe rap is necessary. Jiggle wires to the various units.

d. Watch the voltmeter for any sharp variation in the meter reading. Note the operation of the system.

e. If a variation occurs when a unit is tapped, check that unit for weak connections. Repair connections as necessary.

b. Automatic Temperature Control Tester, J-22368-01

This procedure is designed to assist servicemen in locating a malfunction in the Automatic Climate Control system. If the system is operating incorrectly, but does have some degree of self-modulation, first check adjustment of temperature dial as described in step 7. If system still performs incorrectly, proceed with listed tests.

For positive results, the Automatic Climate Control system should be tested in an area where the ambient temperature is between 70°F and 80°F. If the ambient temperature is below 70°F, the system may not produce full air conditioning, or if above 80°F, the system may not produce full heat.

1. Preliminary Test

a. Place Transmission in PARK and start engine.

b. Disconnect vacuum hose from power servo vacuum power unit, and seal hose with thumb. System and power servo should go to full air conditioning.

c. Connect a vacuum hose from vacuum supply line to power servo vacuum power unit. System and power servo should go to full heat. Reinstall vacuum hoses.

d. If system and power servo performed properly in steps b and c, proceed to step 3.

e. If power servo performed properly, but system did not, in steps b and c, proceed to step 6.

f. If power servo and system failed to perform properly, proceed to step g.

g. Check power servo and temperature door for binding or other mechanical interference. If no mechanical interference is found, replace power servo unit.

h. If system failed to turn on, proceed to step 2.

2. Source Test

a. Turn off engine if still operating and connect Automatic Temperature Control Tester, J-22368-01, as described in Note 51.

b. Turn system ON and set temperature dial to 71° setting.

c. With transmission in PARK position, start engine.

d. Place rocker switch on Automatic Temperature Control Tester, J-22368-01 in MANUAL position.

e. Turn voltage knob to SOURCE position.

f. Set manual control knob to 150 position.

g. Tester meter should read battery voltage.

h. If meter does not read battery voltage, check the power supply wires for shorts, grounds or opens. Check for blown fuse. The tester may be used for checking the wiring by turning the voltage knob to PROBE position and using the red probe.

i. If meter read battery voltage in step g, proceed to step 3.

3. Sensor String Test (Opens)

a. Place rocker switch in MANUAL position.

b. Turn voltage knob to SENSOR position.

c. Set manual control knob to 150 position.

d. Tester meter should read battery voltage.

e. If meter read battery voltage in step d, proceed to step 4.

f. If meter did not read battery voltage in step d, visually inspect in-car sensor, replace if apparently defective, and check operation of system.

g. Check for loose connector at duct sensor and then at ambient sensor. If loose connector is found, repair and check operation of system.

h. If an ohmmeter is available, measure resistance value of ambient sensor, duct sensor and then in-car sensor. Sensor resistance value should approximate resistance value given in Fig. 1-54. Replace any defective sensor located. If no defective sensor is found, check car wiring.

i. If an ohmmeter is not available, substitute a known good ambient sensor, duct sensor, and then in-car sensor; check operation of system after each substitution. If system still fails to perform satisfactorily, check car wiring.

4. Amplifier Test

(NOTE: Sensor string must be tested before testing amplifier.)

a. Place rocker switch in MANUAL position.

b. Turn voltage knob to AMPLIFIER OR CONTROL CAL. position.

c. Turn manual control to MAX. HEAT position.

d. Meter should read from 0 to 4 volts.

e. Turn manual control to MAX. COLD position.

f. Meter should read 8 volts minimum.

g. If steps c through f do not result in correct readings, proceed to step i.

h. If proper readings were achieved in steps c through f, proceed to step 5.

i. Disconnect red wire from temperature dial rheostat terminal. With wire open, system should go to full air conditioning. Meter should read 8 volts minimum.

j. Ground red wire. System should go to full heat, meter should read 0-4 volts.

k. If system performed properly in steps i and j, replace temperature dial rheostat.

l. If system failed to perform properly in steps i and j, replace amplifier circuit board.

m. If system fails to work properly after replacing amplifier circuit board, check car wiring.

5. Transducer Test

a. Place rocker switch in MANUAL position.

b. Turn voltage knob to TRANSDUCER position.

c. Turn manual control to MAX. COLD position.

d. Tester meter should read 8 volts minimum and vacuum gage should read 0-3 inches vacuum. Maximum blower should be achieved.

e. Turn manual control to MAX. HEAT position.

f. Tester meter should read 0-4 volts and vacuum gage should read 9 inches minimum vacuum. Maximum blower should be achieved.

g. If proper readings are not obtained in steps c through f, check wiring to transducer circuit for shorts, grounds or opens. Check for improperly grounded transducer. Replace transducer.

6. System Vacuum Test

a. Tee in a vacuum gage to any nipple of the master switch, and position vacuum gage so that it can be read from the seat.

b. Set the temperature dial to 70° and start engine. Vacuum gage should read above 14 inch Hg. at idle and stay at this setting throughout the check.

c. Slowly rotate temperature dial to 85°, and then back to 65°. If the temperature dial is rotated too rapidly, the vacuum may drop to 9 inch Hg. or so, but it should return to the original setting. This is a normal condition. However, if a vacuum leak is present, the vacuum reading will drop to 6 inch Hg. or less and remain there.

(NOTE: It is possible that a vacuum leak may show up only at a particular setting of the temperature dial. Therefore, whenever the vacuum drops, immediately stop rotating the dial until you are certain whether a leak is present or whether you were turning the dial too fast.)

d. Rotate temperature dial back to 71° setting. Vacuum reading should always be above 14 inch Hg., except in OFF position, where there should be no vacuum reading.

e. If a vacuum leak is present, determine when it is present. Then, referring to Fig. 1-111 and 1-112 determine what valves, hoses and vacuum power units are involved to locate leak.

7. Temperature Dial Test with Automatic Temperature Control Tester, J-22368-01.

a. Place rocker switch in MANUAL position.

b. Set voltage knob to AMPLIFIER OR CONTROL CAL. position.

c. Set manual control to 138 position.

d. Rotate temperature dial until tester meter indicates 6.5 volts.

e. Temperature dial should indicate 75°F.

f. If temperature dial does not indicate proper setting, adjust temperature dial as indicated in Note 53b.

8. Operational Test (697 ONLY)

a. This procedure is to be used when testing the rear system on the Fleetwood Seventy-Five. The tester should be connected to the system as described in Note 55 for rear system. Both systems should be turned ON, the front system should be operating in AUTO. The temperature dials should be set at 75°.

b. Position rocker switch in AUTOMATIC position.

c. Set voltage knob to AMPLIFIER OR CONTROL CAL. position.

d. Set manual control to 150 position.

e. Allow five minutes for systems to stabilize with doors and windows closed.

f. Meter should read 5.5 - 7.5 volts.

g. If improper reading is obtained in step f, check for shorted sensor.

h. If proper reading is achieved in step f, tap sensors and amplifier.

i. If meter needle jumps when a unit is tapped, check that unit for weak connections that will cause an intermittent defect in system.

j. If proper reading is achieved in step f, with no movement of the needle in step i and all steps in part steps 1-7 have been completed, system is operating properly.

k. Shut off engine and remove Automatic Temperature Control Tester, J-22368-01 from system. Connect car wiring harness connector to amplifier connector and large vacuum hose to transducer. Install any trim items removed.

c. Temperature Dial Operational Test

(NOTE: This test is performed without the Automatic Temperature Control Tester, J-22368-01, or Automatic Climate Control Tester, J-21512. Although it is less efficient it allows for the tailoring of a system to meet the requirements of an individual owner.)

a. Using masking tape, suspend a thermometer from headliner so that bulb hangs at breath level over front passenger's seat.

b. Suspend a second thermometer at breath level midway between the rear roof outlets.

c. Position auxiliary fan (approximately 24 inch dia. blades) so that air stream is directed towards air intake grille.

d. Close all doors and windows.

e. Set both temperature dials to 75°.

f. With shift lever in PARK position, start engine and operate at 900 rpm.

g. Making certain that all air conditioner outlets are open, adjust as follows:

1. Front end outlets so that air is directed toward doors.

2. Front center outlet so air is directed toward top of front seat.

3. Rear roof outlet diverter doors should be opened.

(NOTE: Outlet air must not be directed toward thermometers.)

h. Allow systems to operate for 25 minutes for stabilization, then record reading from suspended thermometers.

i. If thermometers vary from 75° setting, adjust temperature dials to coincide with nearest thermometer reading, as indicated in Note 49b.

53. Automatic Climate Control Panel (6F Rear)

a. Removal

1. Remove rear seat cushion by lifting forward edge and pulling forward.
2. Remove rear seat back by removing two screws along lower edge and lifting assembly of mounting hooks.
3. Remove six screws securing right armrest to trim panel and remove armrest.
4. Remove trim pad from right side panel for access to back of panel.
5. Remove radio controls as described in Section 12, Note 70, Steps 12 and 13.
6. Remove electrical connectors from temperature dial and master "ON-OFF" switch.
7. Remove two screws securing control panel to trim pad and remove control panel.

b. Installation

1. Position control panel to trim pad and secure with two screws.
2. Connect electrical connectors at master "ON-OFF" switch and temperature dial.
3. Install radio controls as described in Section 12, Note 70, Steps 4 and 6.
4. Reposition trim pad and install in position on quarter panel.
5. Position armrest against quarter panel and secure with six screws.
6. Install rear seat back on mounting hooks and secure with two screws.
7. Install rear seat cushion.

54. Air Conditioner Control Panel Disassembly and Assembly

a. Temperature Dial Rheostat Removal

1. Remove control panel as described in Note 53a.
2. Disconnect electrical connector inside arm rest.
3. Remove two screws securing rheostat to control panel and remove rheostat.

b. Temperature Dial Rheostat Installation

1. Position rheostat to control panel and secure with two screws.
2. Connect electrical connector.
3. Install control panel as described in Note 53b.
4. Adjust temperature dial as described in Note 48b.

c. Control Switch Removal

1. Remove control panel as described in Note 53a.
2. Disconnect black and yellow hoses from control switch.
3. Remove two screws and remove switch.

d. Control Switch Installation

1. Position switch to control panel and secure with two screws.
2. Connect black and yellow hoses to ports as indicated by color coding dots on switch assembly.
3. Install control panel as described in Note 53b.

55. Amplifier (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Remove multiple connector from amplifier terminals.
3. Disconnect red wire at single connector.
4. Remove spring clip securing multiple connector to mounting plate.
5. Remove screw securing amplifier circuit board to mounting plate.

b. Installation

1. Position amplifier circuit board to mounting plate and install screw securing circuit board to mounting plate.
2. Install spring clip securing multiple connector to mounting plate.
3. Connect red wire at single connector.
4. Connect multiple connector to amplifier terminals.
5. Install trim panel inside luggage compartment.

56. In-Car Sensor (6F Rear)

a. Removal

1. Snap protective grille off in-car sensor on package shelf inside car.
2. Remove two screws securing sensor to package shelf.
3. Disconnect in-car sensor from electrical connector.
4. Carefully remove in-car sensor.

b. Installation

1. Connect in-car sensor to electrical connector.
2. Position in-car sensor on package shelf.
3. Secure in-car sensor to package shelf with two screws.
4. Snap protective grille over in-car sensor on package shelf.

57. Ambient Sensor (6F Rear)

Refer to Note 19 for replacement of the ambient sensor.

58. Duct Sensor (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Disconnect electrical connector from sensor terminals.

3. Remove two screws securing sensor to right mode door assembly and remove sensor.

b. Installation

1. Position sensor to right mode door assembly and secure with two screws.
2. Connect electrical connector to sensor terminals.
3. Install trim panel inside luggage compartment.

59. Water Control Valve (6F Rear)

(NOTE: The water control valve and thermal vacuum valve are serviced as an assembly.)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Pinch off valve inlet and outlet water hoses, Fig. 1-116.
3. Position shallow pan under water control valve to catch any coolant that may spill.
4. Remove clamps securing hoses to valve, and remove water hoses.
5. Remove vacuum hoses from thermal vacuum valve, and remove vacuum hose from water control valve vacuum power unit.
6. Remove horseshoe spring retainer clip securing valve to mounting bracket ar ! remove valve.

b. Installation

1. Position water control valve to mounting bracket and secure with horseshoe spring retainer clip.
2. Install water hoses on valve inlet and outlet fittings and install clamps on hoses.
3. Remove clamps pinching off hoses.
4. Install vacuum hoses on thermal vacuum valve.

(NOTE: Yellow striped hose connects to vacuum nipple closest to water outlet fitting.)

5. Connect red striped vacuum hose to water control valve vacuum power unit.
6. Install trim panel inside luggage compartment.
7. Replace any coolant lost.

60. Blower Resistor (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Remove multiple connector from blower resistor, Fig. 1-116.
3. Remove single connector from blower resistor.
4. Remove two screws securing blower resistor to bottom of case assembly.
5. Remove blower resistor from bottom of case assembly.

b. Installation

1. Position blower resistor into bottom of case assembly.
2. Secure resistor to case assembly with two screws.
3. Install single connector on blower resistor.
4. Install multiple connector on blower resistor.
5. Install trim panel inside luggage compartment.

61. Blower Motor Assemblies (6F Rear)

This procedure applies to both right and left blower motors.

a. Removal

1. Remove trim panel inside luggage compartment.
2. Disconnect double connector at motor to be removed. Connector is located in front of motor, Fig. 1-116.
3. Pull back rubber material from screw heads and remove five screws securing blower motor to blower housing.
4. Remove blower and fan assembly.

b. Installation

1. Position blower motor and fan assembly in blower housing and secure with five screws, and replace rubber insulating material.
2. Connector double connector.
3. Install trim panel inside luggage compartment.

62. Master Switch (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Disconnect vacuum hoses from master switch, Fig. 1-116.
3. Disconnect electrical connector from master switch.
4. Remove screw securing master switch mounting bracket to case and remove master switch and mounting bracket.
5. Separate mounting bracket from master switch.

b. Installation

1. Install mounting bracket on master switch.
2. Position master switch mounting bracket to case and install screw securing mounting bracket to case.
3. Connect electrical connector to master switch.
4. Install vacuum hoses to master switch.
5. Install trim panel inside luggage compartment.

63. Power Servo (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Disconnect multiple electrical connector from power servo, Fig. 1-116.
3. Disconnect multiple vacuum connector from servo valve.
4. Disconnect vacuum hose from power servo vacuum power unit.
5. Disconnect temperature door link at temperature door arm.
6. Remove two screws securing power servo to case.
7. Remove power servo.

b. Installation

1. Position power servo into opening in case and secure with two screws.

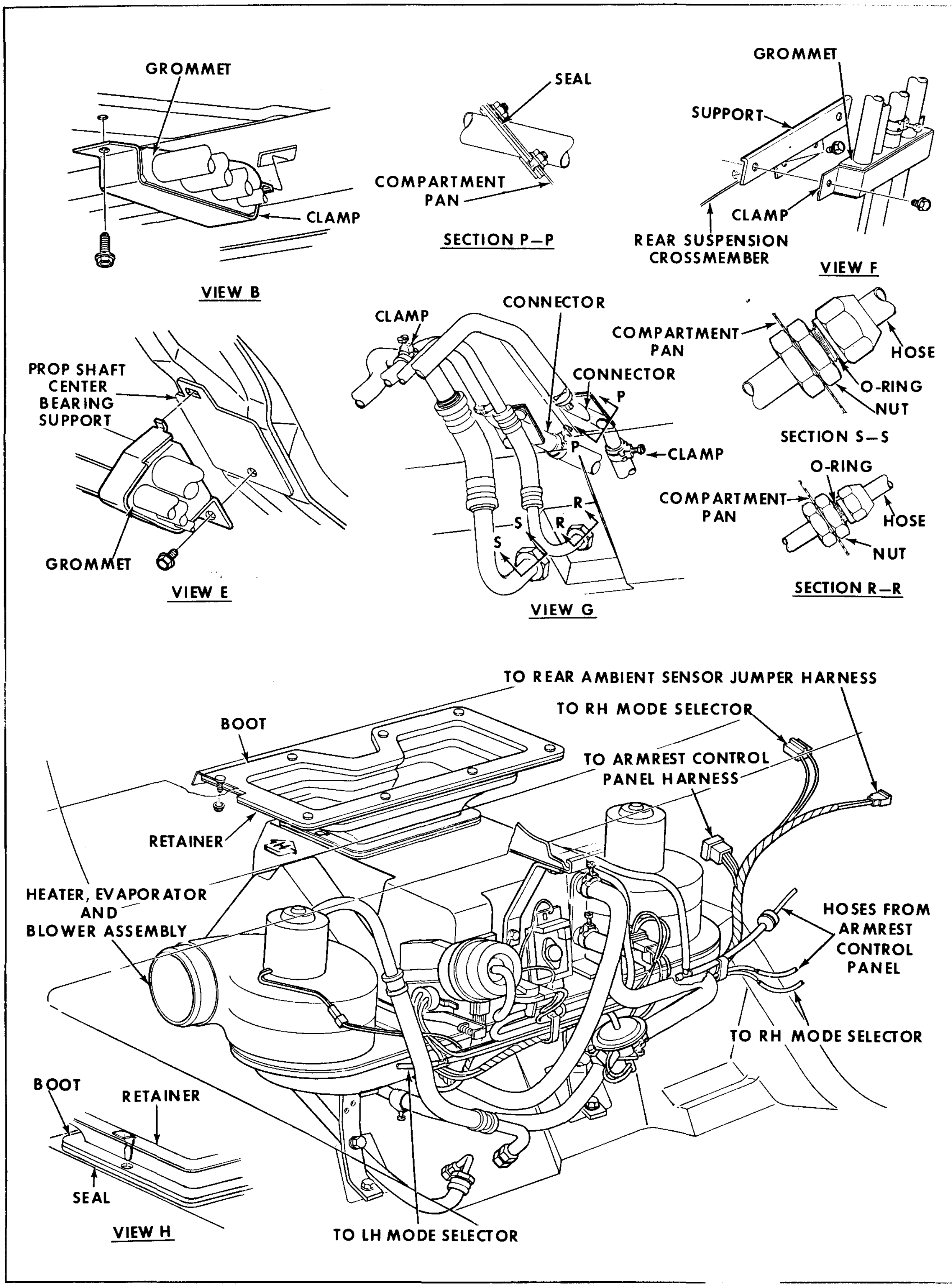


Fig. 1-116 Rear Heater, Evaporator and Blower Assembly

2. Connect vacuum hose to power servo vacuum power unit.
3. Connect multiple vacuum connector to servo valve.
4. Connect multiple electrical connector.
5. Connect temperature door link and adjust as described in Note 55a.
6. Replace trim panel inside luggage compartment.

64. Power Servo Vacuum Valve (6F Rear)

a. Removal

1. Disconnect multiple hose connector.
2. Remove spring clip and one screw securing vacuum valve to power servo.
3. Remove vacuum valve.

b. Installation

1. Position vacuum valve on power servo and secure with one screw and spring clip.
2. Connect multiple hose connector.

65. Mode Door Assemblies

This procedure applies to both right and left mode door assemblies.

a. Removal

1. Remove trim panel inside luggage compartment.
2. Remove duct sensor electrical connector from right mode door assembly only.
3. Remove vacuum hose from mode door vacuum diaphragm.
4. Remove three nuts securing de-fogger duct to outlet grille on package shelf.
5. Loosen clamps securing mode door assembly to blower assembly, heater discharge and air conditioner discharge hoses.
6. Slide discharge hoses off of mode door assembly and lift assembly off of blower outlets.

b. Installation

1. Install mode door vacuum hose on diaphragm.
2. Position mode door assembly on blower outlet.
3. Position heater discharge and air conditioner discharge hoses on mode door assembly.
4. Secure mode door assembly on blower assembly by tightening clamp.
5. Secure heater discharge and air conditioner discharge hoses onto mode door assembly by tightening clamps.
6. Position de-fogger ducts to outlet grille on package shelf, retaining with three nuts.
7. Install duct sensor electrical connector into right mode door assembly only.
8. Install trim panel inside luggage compartment.

66. Transducer (6F Rear)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Disconnect vacuum hoses from fittings on transducer.
3. Disconnect transducer electrical connector.
4. Remove two screws securing transducer mounting bracket to power servo and remove transducer.

b. Installation

1. Position transducer to power servo and secure with two screws.
2. Connect transducer electrical connector.
3. Connect vacuum hoses to fittings on transducer.

(NOTE: Vacuum hose with smallest I.D. goes on top fitting of transducer.)

4. Replace trim panel inside luggage compartment.

67. Compressor Diode Assembly (6F Only)

The procedure for removing and installing the compressor diode assembly is described in Section 12, Note

68. Blower Evaporator Assembly (6F)

a. Removal

1. Remove trim panel inside luggage compartment.
2. Purge system as described in Note 44a.
3. Drain engine cooling system.
4. Raise rear of car and remove clamp securing evaporator drain and remove drain.
5. Disconnect right and left mode door assemblies from blower motors and disconnect tan vacuum hoses.
6. Disconnect ambient air hoses from blower evaporator assembly.
7. Disconnect ambient and duct sensor leads.
8. Disconnect heater supply and return hoses, air conditioner high and low pressure hoses, and vacuum supply hose at connector where they enter luggage compartment below blower evaporator assembly.
9. Disconnect six way electrical connector from body wiring at right side of car.
10. Disconnect yellow and black vacuum hoses at right side of car.
11. Unsnap return air boot from blower evaporator assembly.
12. Remove screw securing bracket to package shelf.
13. Remove four screws securing brackets to floor pan.
14. Lift blower evaporator assembly out of luggage compartment.

b. Installation

1. Position blower evaporator assembly in luggage compartment.
2. Connect right and left mode door assemblies to blower evaporator outlets.
3. Connect tan vacuum hoses.
4. Connect return air boot to blower evaporator case.

5. Connect yellow and black vacuum hoses at right side.
6. Connect six-way electrical connector at right side.
7. Connect heater supply and return hoses, air conditioner high and low pressure hoses, and vacuum hose at connectors under blower evaporator assembly. Refer to Fig. 1-117. Recover low pressure hose with insulation.
8. Connect ambient and duct sensor leads.
9. Connect ambient air hoses to blower evaporator.
10. Secure lower brackets to floor pan with four cap screws.
11. Secure upper bracket to package shelf with screw.
12. Raise rear of car and install evaporator drain assembly.
13. Fill engine cooling system.
14. Evacuate system as described in Note 44c.
15. Charge system as described in Note 44d.
16. Replace trim panel inside luggage compartment.

69. POA Suction Throttling Valve (6F Rear)

a. Removal

1. Remove blower evaporator assembly as described in Note 68a.
2. Remove screw securing suction throttling valve clamp to case assembly.
3. Disconnect equalizer line.
4. Disconnect low pressure line form suction throttling valve.
5. Disconnect suction throttling valve from evaporator outlet pipe.

b. Installation

1. Connect suction throttling valve to evaporator outlet pipe.
2. Connect low pressure line to suction throttling valve, and cover with insulation.
3. Connect equalizer line to suction throttling valve.
4. Secure suction throttling valve to case assembly with clip and one screw.
5. Install blower evaporator assembly as described in Note 68b.

70. Evaporator Core

a. Removal

1. Remove blower evaporator assembly as described in Note
2. Remove 29 screws and 4 nuts holding evaporator case together and remove bottom of case.
3. Remove screw and clamp securing high pressure line to bottom of case assembly.
4. Disconnect suction throttling valve from evaporator outlet pipe.
5. Disconnect equalizer line from suction throttling valve.
6. Remove ambient air inlet fittings from case.
7. Remove four screws on top of case securing evaporator core to case and remove evaporator core from case.
8. Remove expansion valve from evaporator core as described in Note 71a.

b. Installation

1. Install expansion valve to evaporator core as described in Note 71b.
2. Position evaporator core in case assembly and secure with four screws.
3. Install ambient air inlet fittings on case.
4. Connect suction throttling valve to evaporator outlet pipe.
5. Connect equalizer line to suction throttling valve.
6. Position bottom of case on assembly and secure with 29 screws and 4 nuts.
7. Secure high pressure line to bottom of case with clamp and screw.
8. Install blower evaporator assembly as described in Note 68b.

71. Expansion Valve

a. Removal

1. Remove blower evaporator assembly as described in Note 68a.
2. Remove evaporator core assembly as described in Note 70a.
3. Remove power element bulb from evaporator outlet pipe.
4. Disconnect equalizer line from POA suction throttling valve.
5. Disconnect expansion valve from evaporator inlet.

b. Installation

1. Connect expansion valve to evaporator inlet.
2. Connect equalizer line to suction throttling valve.
3. Position power element bulb on evaporator outlet and secure.
4. Replace evaporator core assembly as described in Note 70b.
5. Replace blower evaporator assembly as described in Note 68b.

72. Heater Core

a. Removal

1. Remove blower evaporator assembly as described in Note 68a.
2. Remove inlet and outlet hoses from heater inlet and outlet pipes.
3. Remove 29 screws and 4 nuts securing evaporator case together.
4. Remove clamp and screw securing high pressure line to bottom of case.
5. Remove sealing grommet around heater inlet and outlet pipes.
6. Remove 6 screws securing temperature door baffle to case and remove baffle.

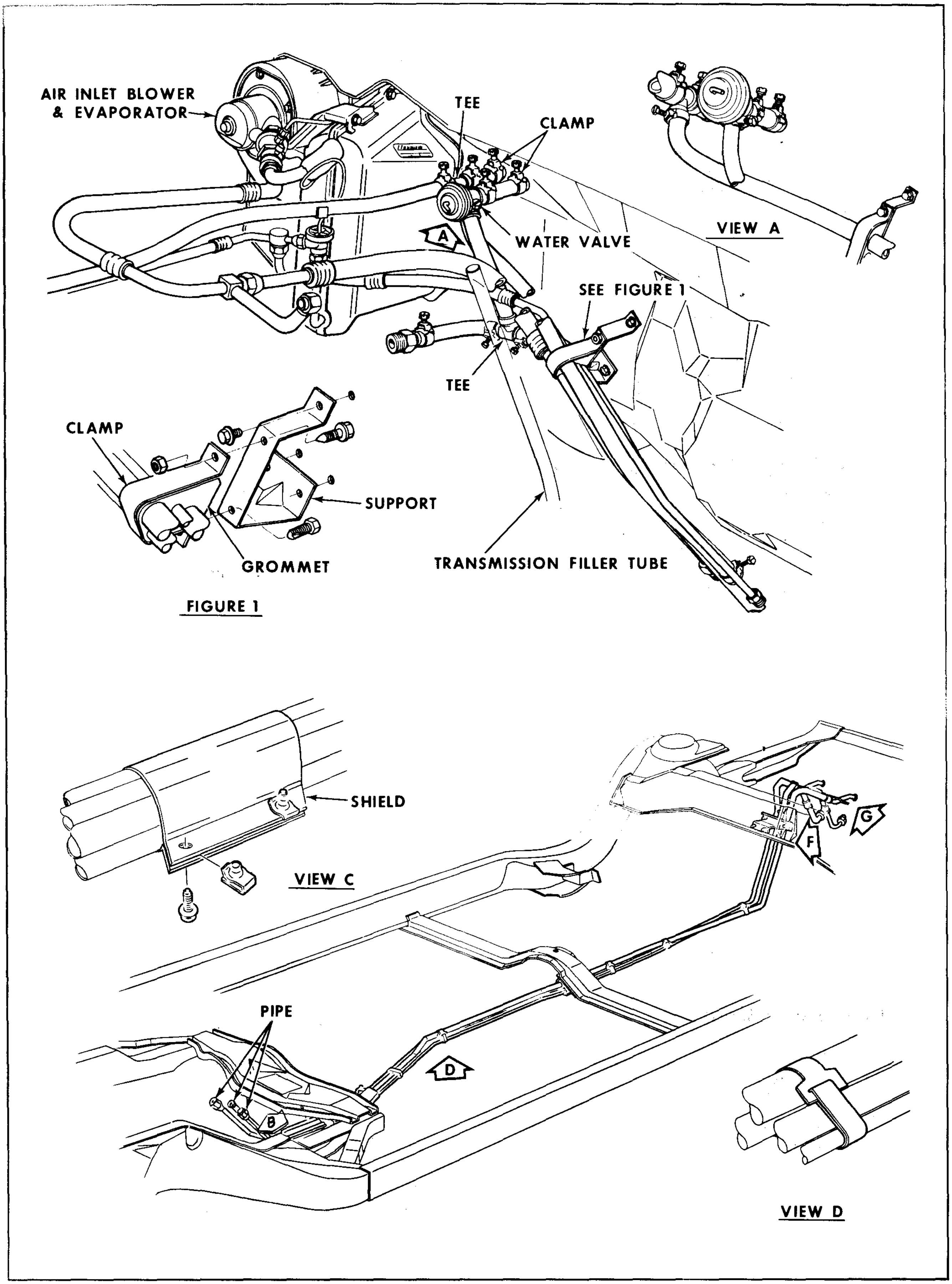


Fig. 1-117 Refrigerant and Water Lines

7. Remove 6 screws, 3 each side of case, securing heater core and baffle to case.
8. Lift heater core and baffle from case.
9. Remove 4 screws securing baffle to heater core and remove baffle.
10. Remove retainers from heater core.

b. Installation

1. Position retainers to heater core and secure baffle to retainers with 4 screws.
2. Position heater core in case and secure with 6 screws, 3 each side.
3. Install temperature door baffle.
4. Seal hole around heater inlet and outlet pipes with sealing grommet.
5. Position bottom of case on assembly and secure with 29 screws and 4 nuts.
6. Secure high pressure line to bottom of case with clamp and screw.
7. Install inlet and outlet hoses to heater core pipes.
8. Install blower evaporator assembly as described in Note 68b.

THEORY OF OPERATION
HEATER ONLY—ALL SERIES

The Cadillac standard heater system uses the air mix principle of heat regulation.

The heating system, Fig. 1-118, incorporates a blower assembly mounted on the right-hand side of the cowl in the engine compartment and a heater assembly located on the cowl but inside the car under the instrument panel. These units provide heated air for the front and rear passenger compartments and to the windshield for defrosting and defogging.

Outside air is drawn through the cowl vent duct into the blower assembly. The blower provides air which may be directed to go through the heater core or by-pass the heater core. The desired discharge temperature is obtained by mixing the heated air with the unheated air in the necessary proportions. The temperature of the air discharged into the passenger compartment is controlled by the temperature door inside the heater assembly. This door is operated by a cable connected to the temperature lever on the control head. With the temperature lever in the On setting, no air is directed through the heater core. With the temperature lever all the way to the right, no air is allowed to by-pass the heater core.

The defroster door and the diverter door are located on the heater assembly.

The diverter door is located near the right-hand end of the heater assembly. Whenever the heater control is in the "On" position, the diverter door vacuum actuator is vented, the diverter door seals against the diverter door opening and air is allowed to flow into the heater assembly for heating and defrosting, Fig. 1-119. With the heater control in the "Off" position, vacuum is applied to the diverter door vacuum actuator. The diverter door is then positioned to seal off air flow through the heater assembly and divert air into the car through the diverter door opening, under the instrument panel at the right side of the car. Since the blower motor operates whenever the ignition is on, this provides positive air flow into the car when the heater control is in the "Off" position.

The heater control panel, Fig. 1-120, is located in the instrument cluster to the left of the steering column. The fan switch provides three speeds - low, medium and high.

With the temperature lever in the On position, advancing the HEAT-DEFROST lever to the HEAT position vents the vacuum operated defroster door, Fig. 1-118, opening it to provide air to the heater outlet. From the heater outlet the air is distributed around the front floor and under the seat to the rear floor. With the door in this position, a small portion of the discharge air is directed to the windshield through the defroster outlets.

Moving the HEAT-DEFROST lever to the DEFROST position supplies vacuum to the defroster door vacuum actuator and positions the defroster door such that most of the discharge air is directed to the windshield, Fig. 1-118, while the remaining discharge air is directed to the heater outlet. In all positions of the HEAT-DEFROST lever, the fan switch controls the three blower speeds.

The air flow paths as described above are shown in Fig. 1-119.

All Cadillacs with the heater only system are equipped with a variable restrictor at the heater outlet fitting on the cylinder head water feed nipple. This restrictor serves to regulate both water flow and water pressure to the heater core as the pressure in the engine cooling system rises due to increasing engine speed.

Ventilation

On cars not equipped with air conditioning an upper level - lower level ventilation system is provided to circulate outside air through the passenger compartment. Ventilating air enters the car through an opening at the base of the windshield and is discharged into the passenger compartment either through grilles near the cowl side trim panels (lower level) or through a grille in the instrument panel, (upper level). Air exhaust grilles are incorporated into each door lock pillar to allow air to leave the car, providing positive air flow even when windows are closed.

Separate control knobs for the low level ventilation outlets are located in the cowl side trim panels. The control for the upper level ventilation is located at the centerline of the car on the steering column lower cover.

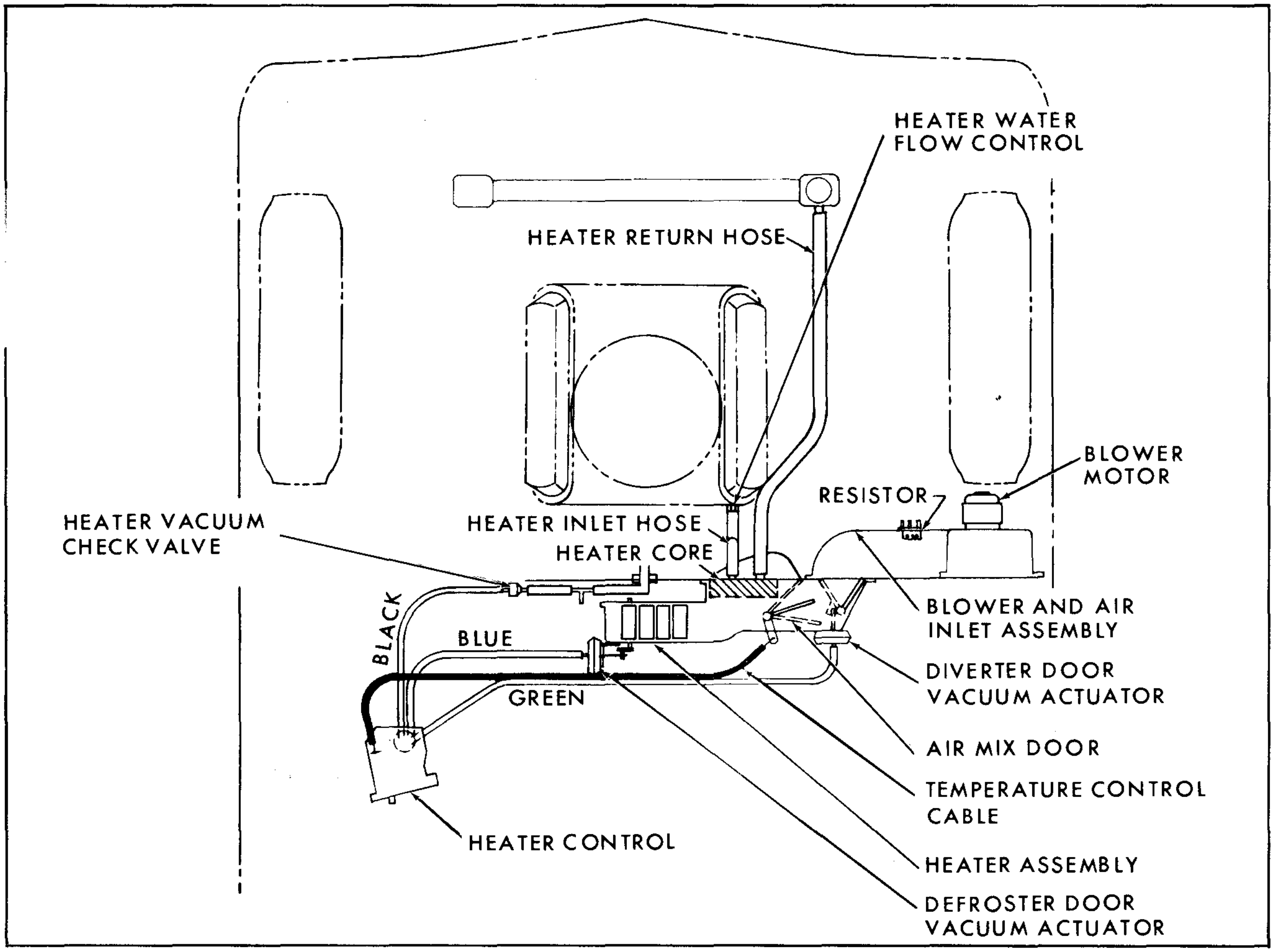


Fig. 1-118 Location of Heater Components

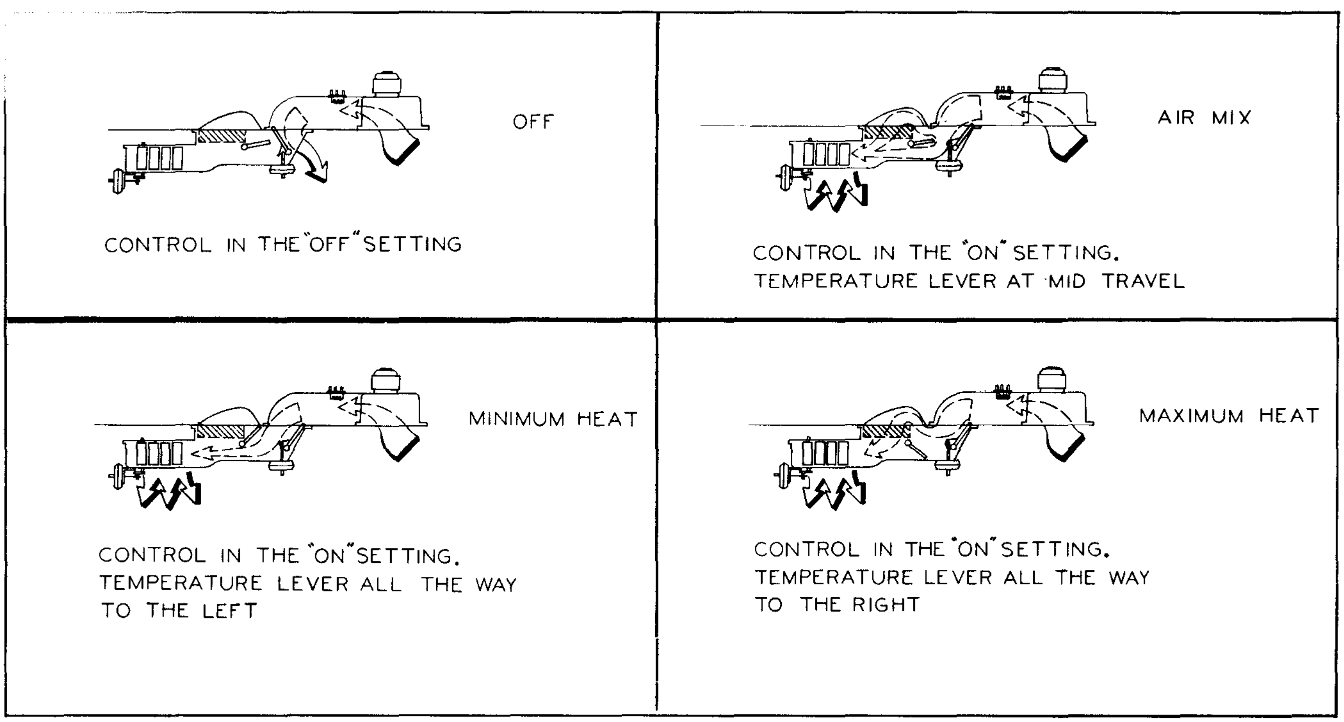


Fig. 1-119 Heater Air Flow

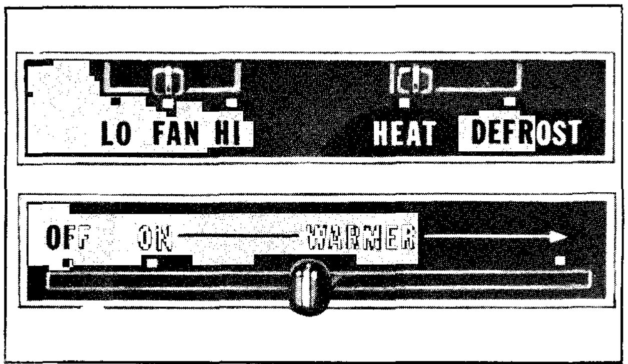


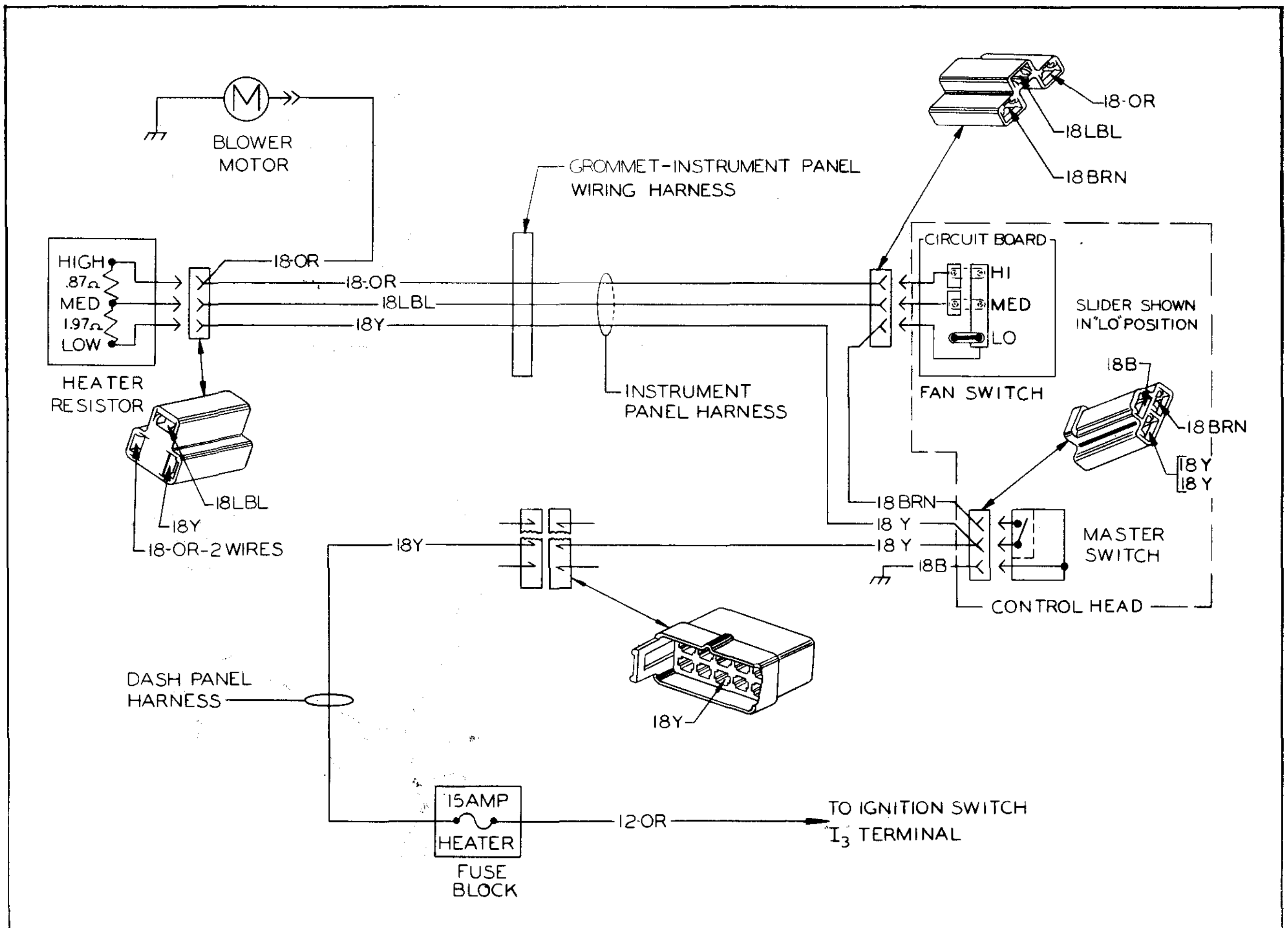
Fig. 1-120 Heater Control Panel

Pulling out the knobs opens air doors which admit air to the grilles.

The knobs can be pulled out partially or all the way to admit as much as air as desired. The vanes in the center outlet on the instrument panel can be set to direct air to the right or left or up and down.

Electrical Circuit

The heater electrical circuit is illustrated in Fig 1-121, the current flows from the batterv through the ACC terminal of the ignition switch, and through a 15 ampere fuse to the master ON-OFF switch, located on the control panel. When the master switch is closed, current flows to the blower control switch, through the blower resistor, to the blower motor, and to ground.



WIRE IDENTIFICATION CHART

SYM.	COLOR	SYM.	COLOR
B	BLACK	P	PINK
BRN	BROWN	PUR	PURPLE
DBL	DARK BLUE	R	RED
DG	DARK GREEN	T	TAN
GY	GRAY	V	VIOLET
LBL	LIGHT BLUE	W	WHITE
LG	LIGHT GREEN	Y	YELLOW
OR	ORANGE		

WIRE GAUGE — 908 - 18 — B / W — WIRE COLOR
CIRCUIT — STRIPE COLOR WHEN USED

Fig. 1-121 Heater Electrical Circuit

73. Upper Level Ventilation Door Adjustment

(NOTE: There is no adjustment for the lower level ventilation door.)

Loosen screw that secures upper level ventilation door bowden cable clamp and position bowden cable so that door fully closes when knob is pushed all the way inward.

74. Heater Control Panel

The procedure for removing and installing the Heater Control Panel assembly is described in Section 12, Note 65.

75. Blower Resistor

a. Removal

1. Disconnect electrical connector to blower resistor at heater blower assembly.
2. Remove two screws and resistor from heater-blower assembly.

b. Installation

1. Position blower resistor on heater blower assembly and secure with two screws.
2. Connect electrical connector at blower resistor.

76. Heater Blower Motor

a. Removal

1. Disconnect electrical connector at lead to motor, Fig. 1-122.
2. Remove five screws securing blower to case and remove blower.

b. Installation

1. Place bead of sealer around opening where blower will contact case.
2. Guide blower motor against cowl and place on locating dowel.
3. Install six screws securing blower to case.
4. Connect electrical connector at lead to motor.

77. Heater Case

a. Removal (Fig. 1-123)

1. Drain cooling system.
2. Remove heater hoses from heater core nipples.
3. Remove instrument panel top cover as described in Section 12, Note 40a.
4. Remove two screws and position center ventilation duct and sleeve out of way.
5. Remove vacuum hoses from diverter door and defroster door vacuum actuators, Fig. 1-124.
6. Remove bowden cable from temperature door arm and remove screw securing cable to heater case. Reposition cable out of way.

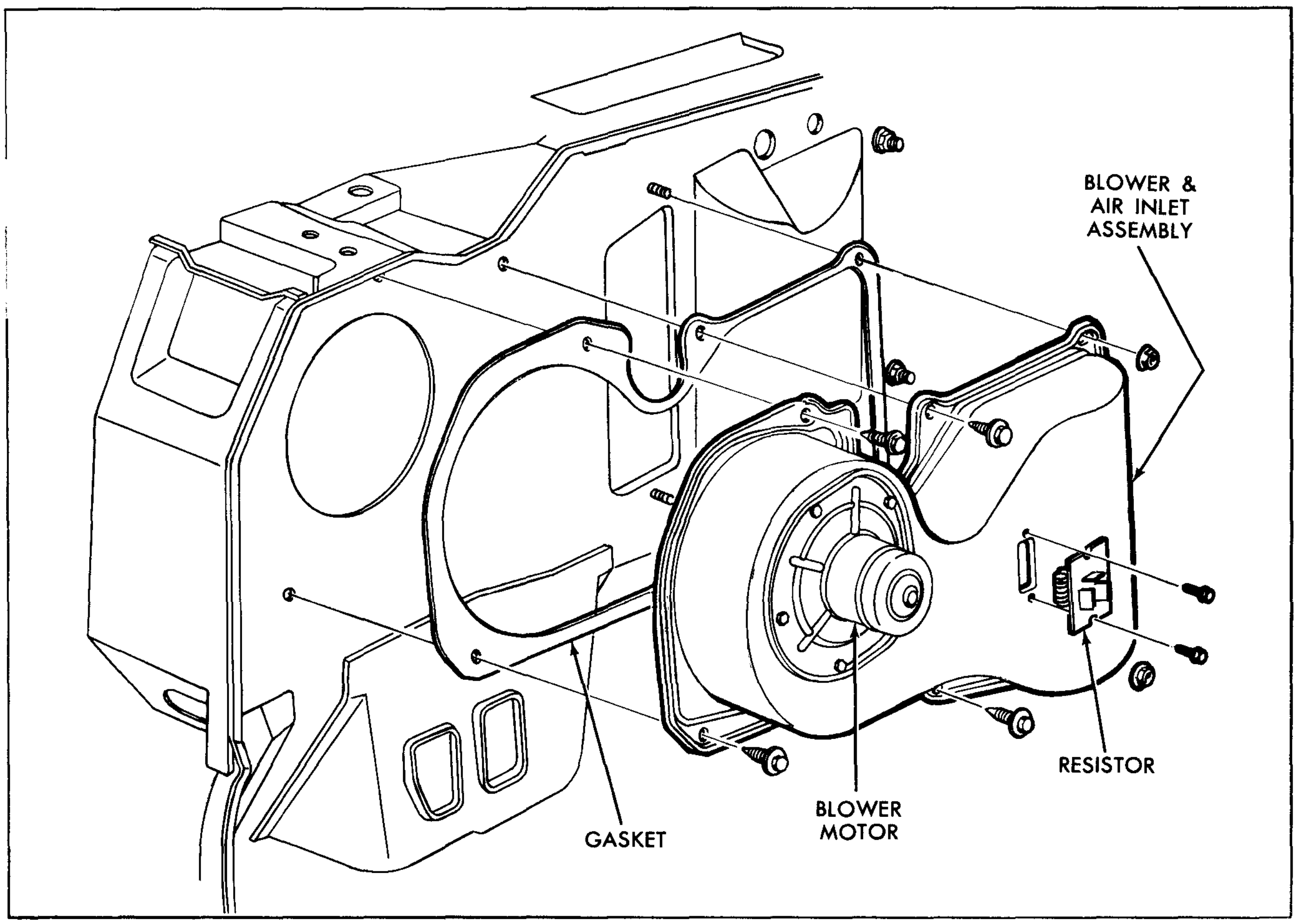


Fig. 1-122 Heater Blower

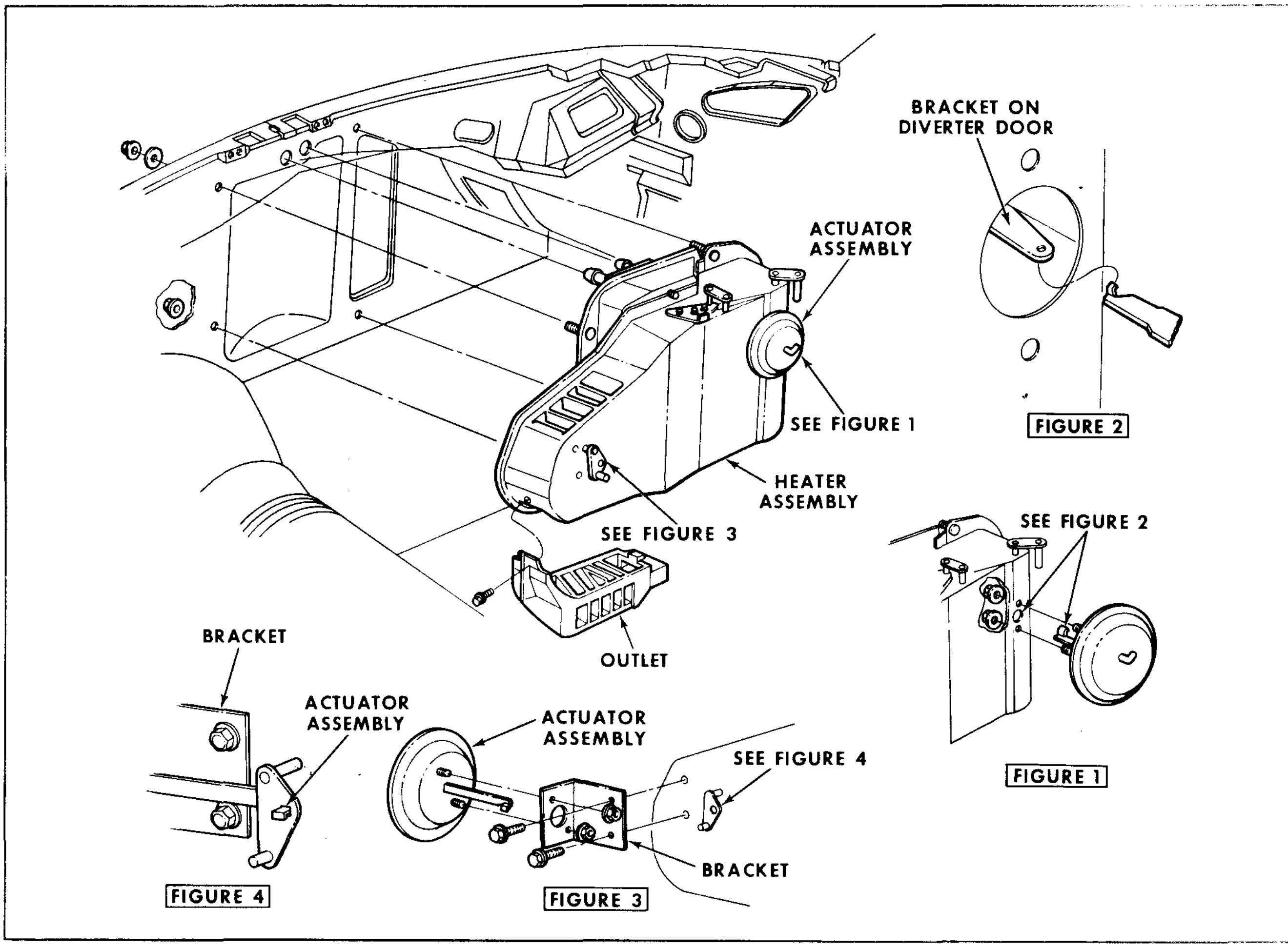


Fig. 1-123 Heater Assembly Installation

7. Remove two screws and two nuts securing heater case to cowl and pull case away from cowl.

8. Remove heater case from position under instrument panel, being careful to hold case as upright as possible to avoid spilling coolant from heater core nipples on carpet.

b. Installation

1. Position heater case under instrument panel and move into position on cowl.

2. Working under hood, install two screws and two nuts securing heater case to cowl.

3. Install heater hoses to heater core nipples. Secure with clamps.

4. Refill cooling system.

5. Install bowden cable to temperature door and secure cable to case with one screw.

6. Install vacuum hoses to diverter door and defroster door vacuum actuators.

7. Position center ventilation duct and secure with two screws. Install rubber sleeve between duct and outlet.

8. Install instrument panel top cover as described in Section 12, Note 40b.

78. Heater Core

a. Removal

1. Remove case as described in Note 77a.

2. Remove two screws and retainer at each side of core securing core to case and remove core.

3. Remove rubber grommet from heater core water nipples.

b. Installation

1. Install rubber grommet around water nipples and position core in heater case.

2. Position retainers at ends of core and secure with two screws.

3. Install heater case as described in Note 77b.

TORQUE SPECIFICATIONS METAL TUBING

Metal Tube O.D. (Inch Lbs.)	Steel Tubing Torque (Ft. Lbs.)	Alum. Tubing Torque (Ft. Lbs.*)
1/4"	15	7
3/8"	35	13
1/2"	35	13
5/8"	35	21
3/4"	35	28

*Torque taken with crow foot attachment at a 90° angle on torque wrench.

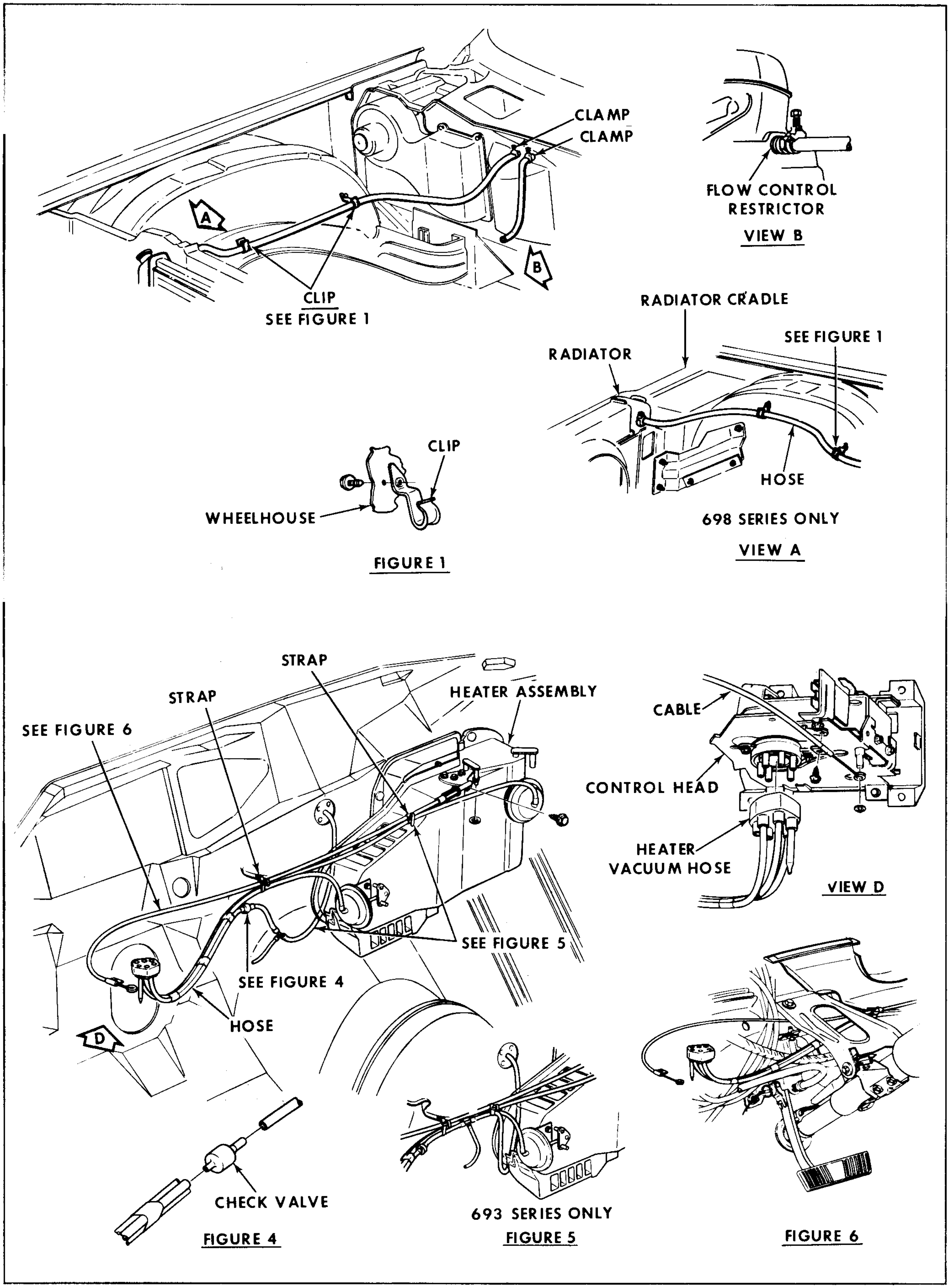


Fig. 1-124 Heater Vacuum Hoses and Cables

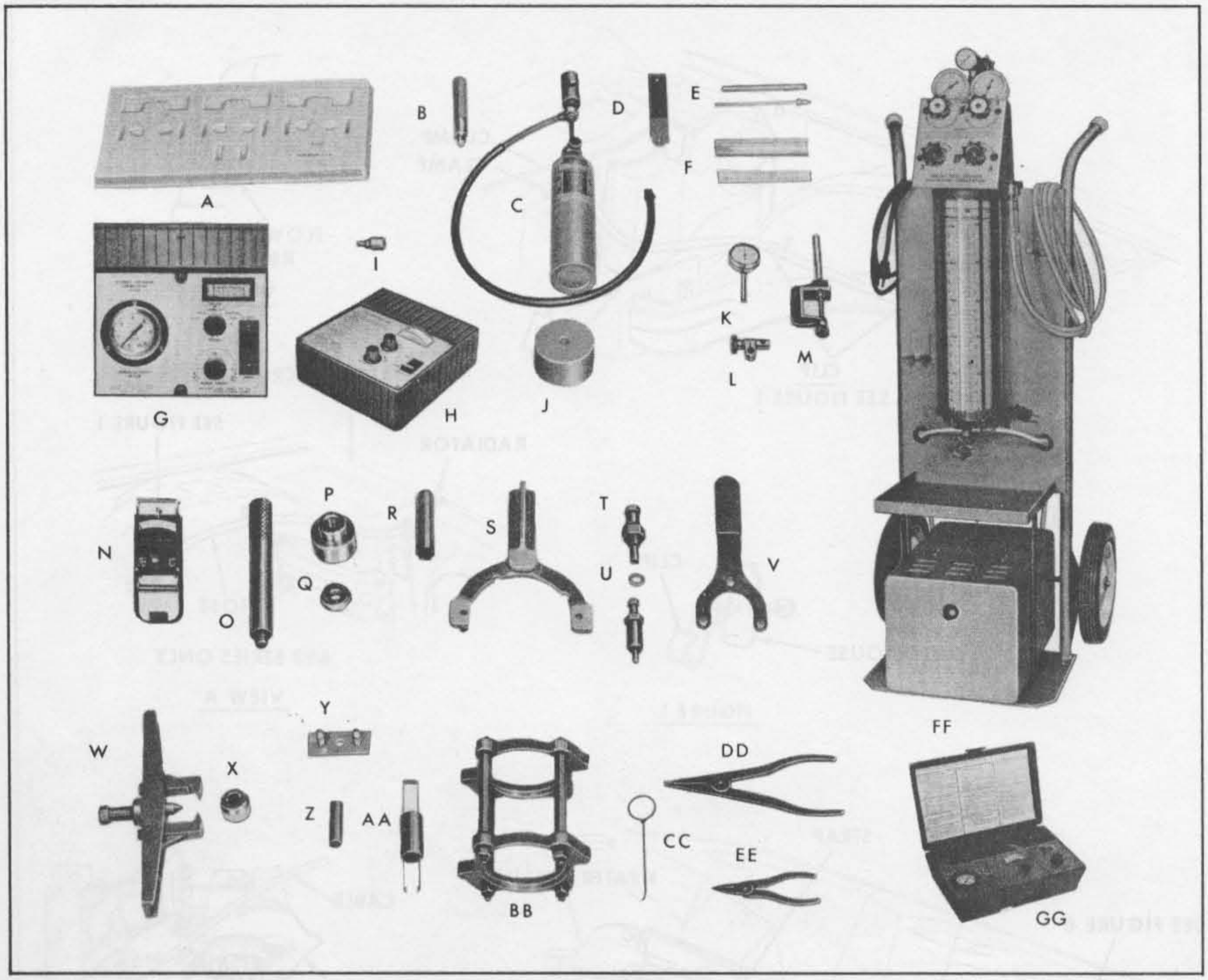


Fig. 1-125 Special Tools

Key	Tool No.	Name	Key	Tool No.	Name
A	J-9402	Parts Tray	R	J-9392	Seal Remover and Installer
B	J-9432	Needle Bearing Installer	S	J-9396	Holding Fixture
C	J-6084	Leak Detector Torch	T	J-9480	Clutch Plate and Hub Assembly Installer (2 Pieces)
D	J-21530	Temperature Dial Adjuster	U	J-9401	Clutch Plate and Hub Assembly Remover
E	J-5421	Thermometer	V	J-9403	Clutch Hub Holding Tool
F	J-6076	Humidicator	W	J-8433	Pulley Puller
G	J-21512	Automatic Climate Control Tester	X	J-9395	Puller Pilot
H	J-22368-01	Automatic Temperature Control Tester	Y	J-9625	Test Plate
I	J-5420	Gage Adapter (2 Required)	Z	J-9399	9/16" Thin Wall Socket
J	J-9521	Internal Assembly Support	AA	J-9393	Seal Seat Remover and Installer (2 pcs.)
K	J-8001-3	Dial Indicator	BB	J-9397	Compressor Fixture
L	J-8001-2	Sleeve	CC	J-5139	Oil Pick-Up Tube Remover
M	J-8001-1	Clamp	DD	J-6435	Snap Ring Pliers (#26)
N	J-23600	Tension Gage	EE	J-5403	Snap Ring Pliers (#21)
O	J-8092	Universal Handle	FF	J-23500	Charging Station
P	J-9398	Pulley Bearing Remover	GG	J-23678	A/C Tester
Q	J-9481	Pulley and Bearing Installer			

GENERAL DESCRIPTION

Radiator

A crossflow radiator, Fig. 13-1, is used as part of the engine closed cooling system. The radiator is constructed with two vertical tanks that connect to the enclosed crossflow tubing. The radiator filler neck, vented pressure cap, and coolant reservoir tube are located on the corner of the right tank.

A radiator coolant reservoir is located to the left of the radiator. Service information pertaining to the reservoir is covered in Section 6, Note 4.

Radiator Cradle (Figs. 13-2 and 13-3)

All radiator cradles have an integral fan shroud, and trays on the left and right sides of the radiator to mount the reservoir bottle and the battery, respectively. Attached to the outboard end of each tray on Limousines, Commercial Chassis, and Eldorados is a support rod which in turn is fastened to a bracket on the bumper outer end. These rods assist in guiding the movement of the bumper during the stroke of the Energy Absorbing Devices.

A reinforcement strut rod is connected to the tie bar and the bottom of the cradle with two bolts and U-nuts. On all cars except the Eldorado, the cradle is further reinforced by two cross struts that fasten the tie bar at each side of the radiator to the front frame horns. A short length of hose on one of the struts serves to prevent rattling. In addition, strut rods extend forward from each wheelhousing to the radiator cover.

Radiator Cradle Mounts

All cars except the Eldorado use three radiator cradle mounts, Fig. 13-4. The inboard mount attaches directly to the frame front cross member. The two outboard mounts are fastened to the trays on either side of the radiator and are supported by adjustable brackets

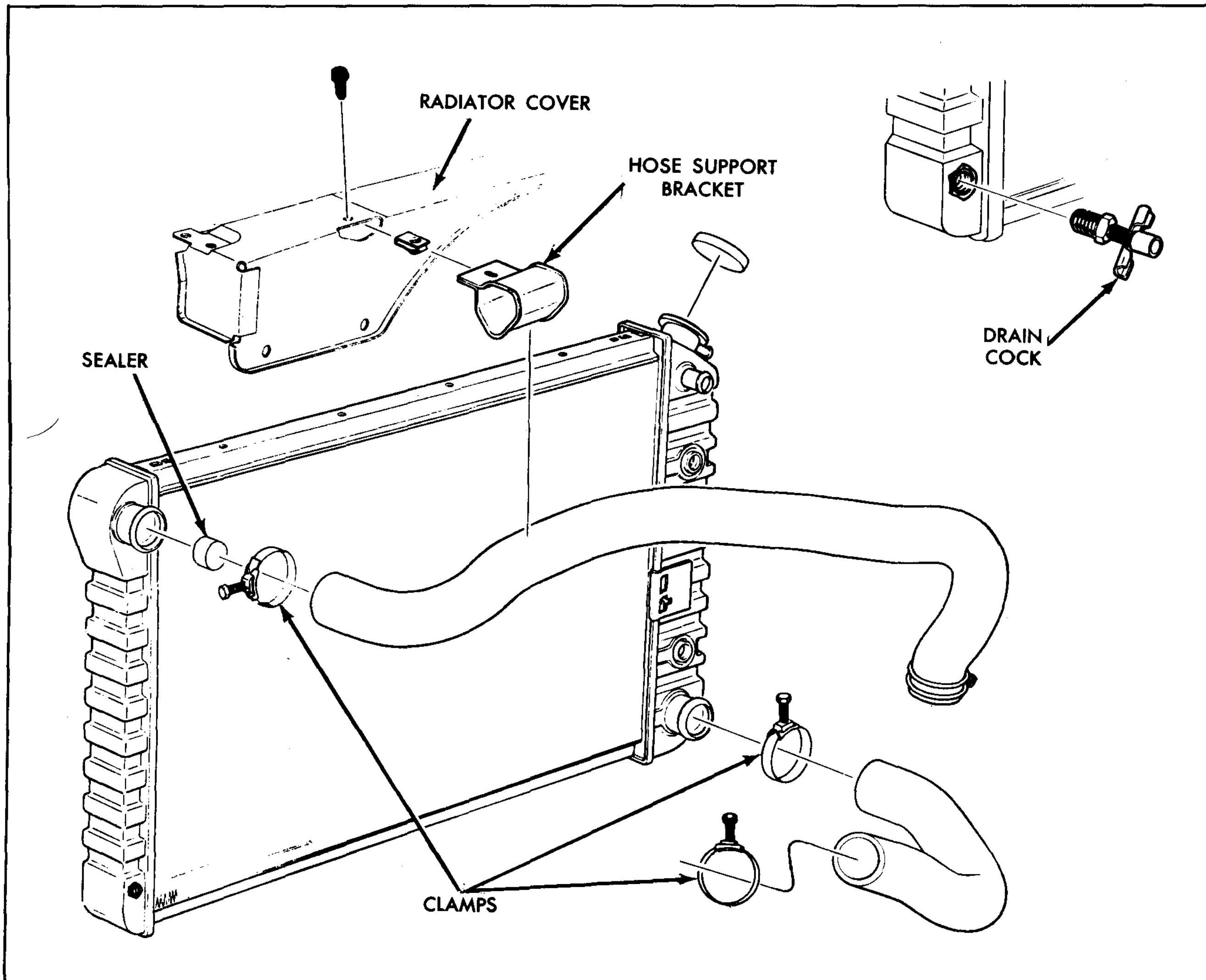


Fig. 13-1 Radiator Assembly and Hoses

13

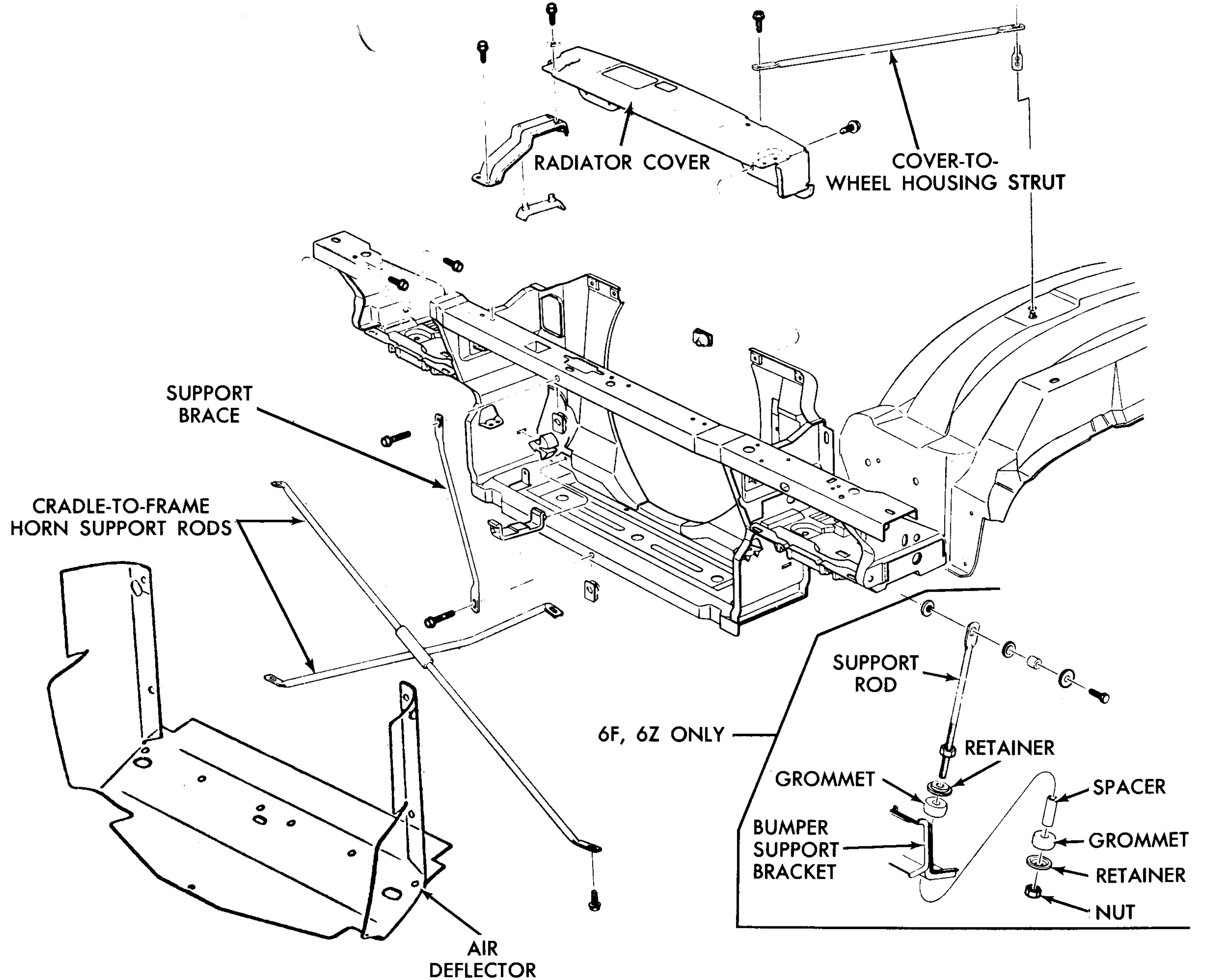


Fig. 13-2 Radiator Cradle Assembly—Except Eldorado

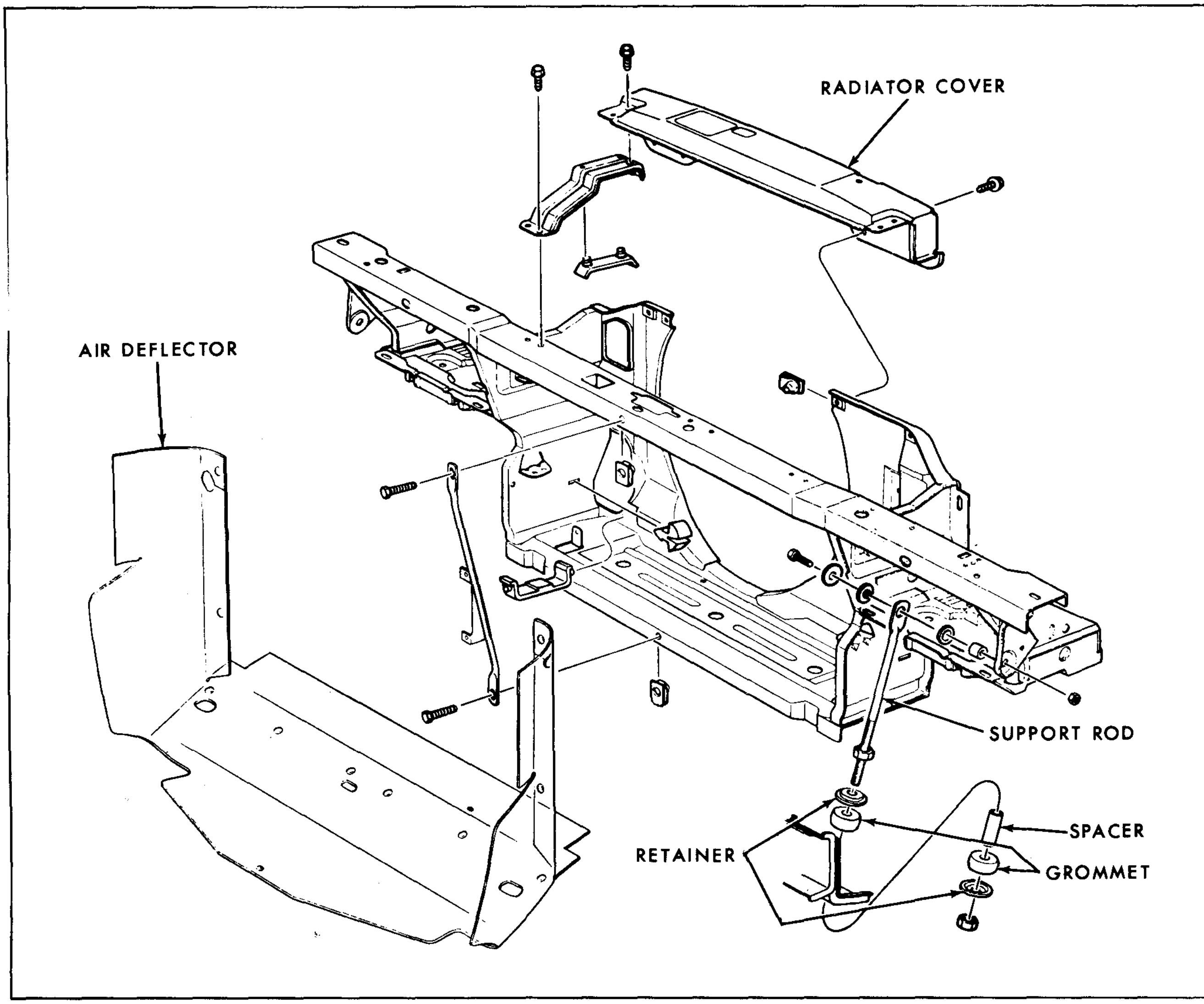


Fig. 13-3 Radiator Cradle Assembly—Eldorado

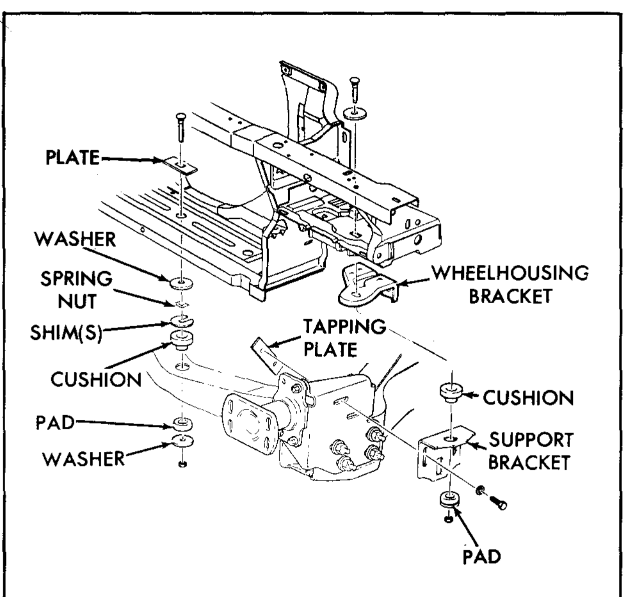


Fig. 13-4 Radiator Cradle Mounts—Except Eldorado

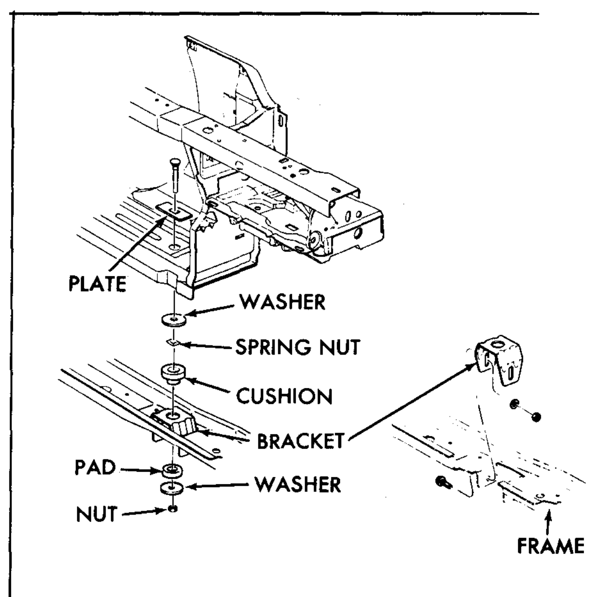


Fig. 13-5 Radiator Cradle Mounts—Eldorado

fastened to the Energy Absorber mounting brackets, Fig. 13-4.

The Eldorado employs two radiator cradle mounts. The mounts fasten to special mounting brackets which, in turn, are fastened to the frame front cross member by two bolts, nuts, and washers.

Grille

The grille is of chrome plated, injection-molded plastic construction. Both upper and lower grilles are mounted to the bumper and travel with the bumper during compression and rebound strokes of the Energy Absorbing units. Mounting provisions for the upper and lower grilles are independent of each other so that either portion may be removed without disturbing the other.

The appearance of the Eldorado grille is unique. All other associated parts, however, including mounting braces, brackets, and fasteners are identical for all series.

SERVICE INFORMATION

1. Radiator

a. Removal

1. Disconnect negative battery cable.
2. Place drain pan under radiator and open drain cock at bottom left corner of radiator. Remove radiator cap so coolant will flow freely.
3. Loosen hose clamps and disconnect upper and lower radiator hoses at radiator.
4. Loosen clamp and disconnect heater return hose at right radiator tank.
5. Disconnect two transmission cooler lines at transmission fluid cooler tank on right side of radiator. Plug all openings to prevent loss of fluid.
6. Remove one screw securing upper radiator hose clamp to radiator cover panel.
7. Remove six screws securing radiator cover panel and remove panel.
8. Remove reservoir hose from filler neck and two straps from top of radiator and position hose out of way.

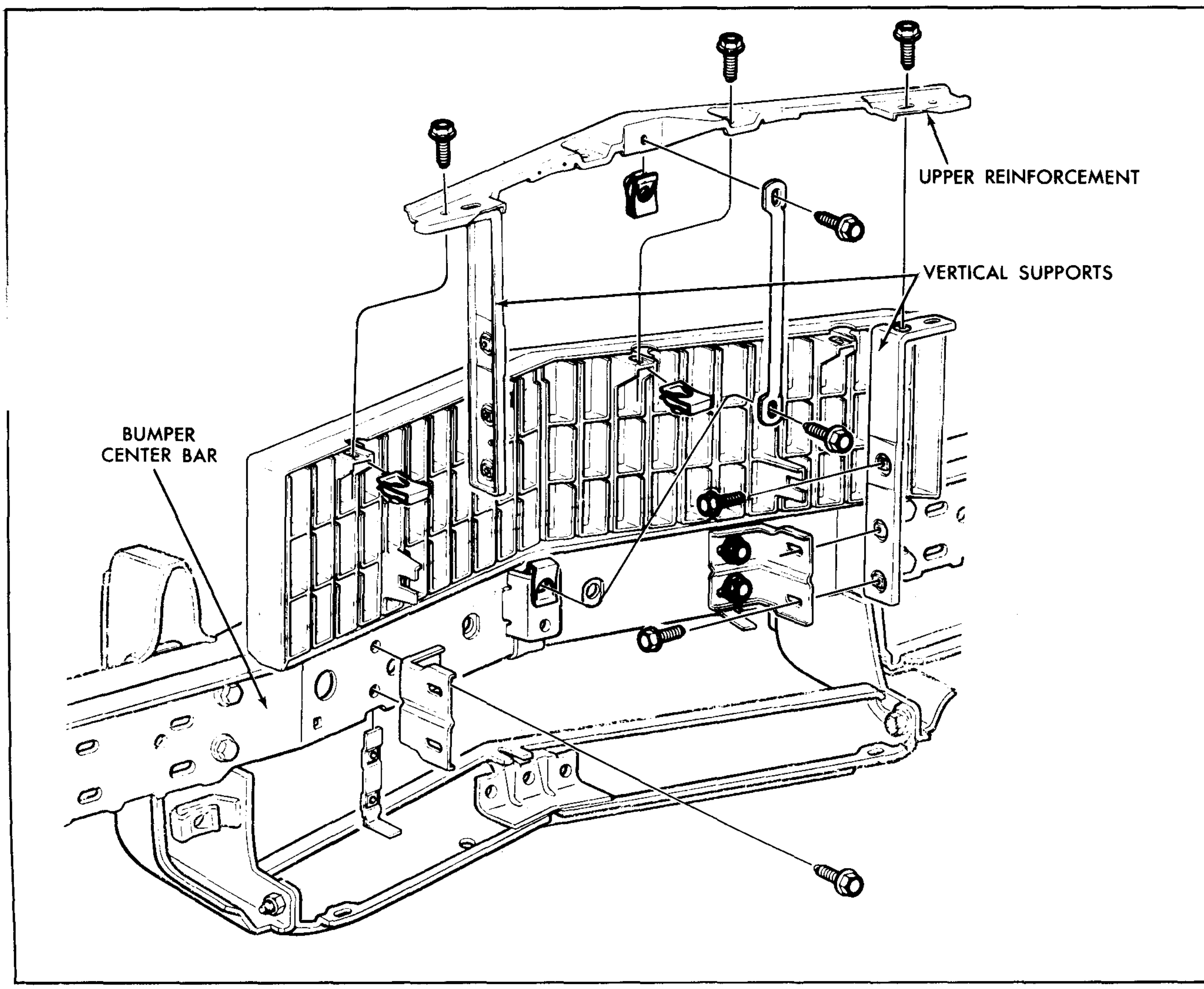


Fig. 13-6 Upper Grille Assembly

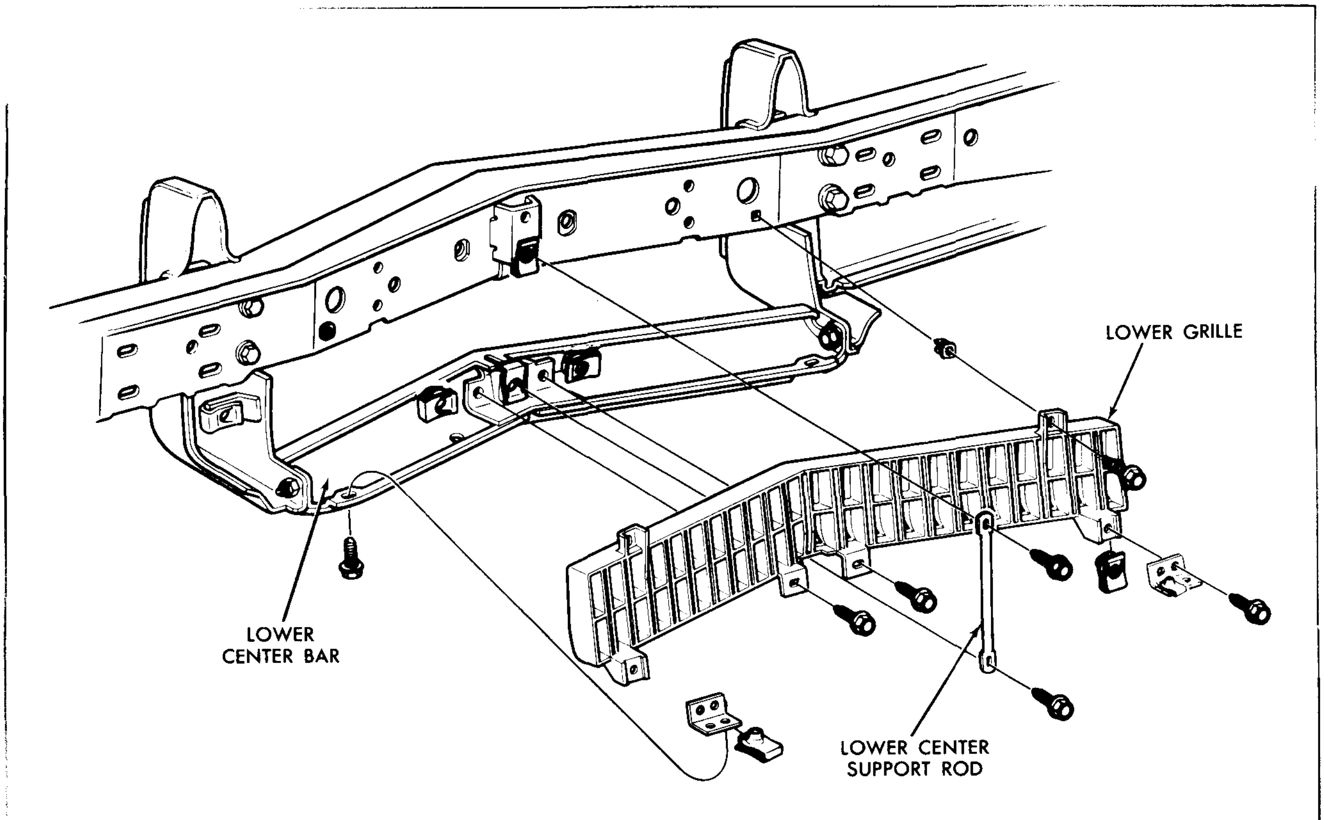


Fig. 13-7 Lower Grille Assembly

9. Being careful not to damage radiator, remove radiator by lifting straight up.

b. Installation

1. Carefully lower radiator into position in cradle.
2. Connect reservoir hose to filler neck and install two straps at top of radiator, securing with four screws.
3. Install radiator cover panel and secure with six screws.
4. Install one screw securing upper radiator hose clamp to cover panel.
5. Connect two transmission cooler lines at transmission fluid cooler tank on right side of radiator, tightening to 20 foot-pounds.
6. Connect upper and lower radiator hoses at radiator and secure with hose clamps.
7. Connect heater return hose to right radiator tank.
8. Close radiator drain cock, and fill cooling system with recommended coolant.
9. Connect negative battery cable.
10. Set Automatic Climate Control to "DEF" position and rotate temperature dial to 85°. If car is equipped with heater only, set controls in maximum heat position.
11. Run engine sufficiently to pump coolant through entire system and check radiator and transmission for fluid levels.
12. Install radiator cap and check all connections for leaks.

2. Radiator Cradle Mounts

a. Inboard Mounts

The actual number of shims used may vary with each installation. Use the quantity necessary to fill the gap remaining between the cradle and frame after the mounting pads are installed and the sheet metal aligned. The correct number of shims required may be determined by attempting to rotate the pad between the cradle and the frame. If the pad can be rotated with the fingers, add shims until pad can no longer be rotated.

b. Outboard Mounts

The cradle support brackets adjust vertically on the EA brackets via slotted holes; therefore, no shims are required. Although three slots are provided, only two screws and washers and one tapping plate are used. Third hole makes bracket interchangeable between left and right side of car.

3. Upper Grille (Fig. 13-6)

a. Removal

1. Open hood.
2. Remove two screws and washers securing Guide-Matic photosensor bellows to rear of left side of grille and pull bellows away from grille.

3. Remove four screws securing grille to upper grille reinforcement.

4. Loosen one screw securing each of two rear grille mounting tabs to vertical grille supports.

5. Taking care not to damage bumper, slide grille forward until disengaged from supports and reinforcement, then lift straight up.

b. Installation

1. Install U-nuts on four upper attaching lugs on grille.

2. Slide grille carefully into position to avoid scratching bumper. Engage slots in rear grille mounting tabs with retaining screws on grille supports and line up screw holes in grille upper lugs with holes in grille upper reinforcement.

3. Insert four screws securing grille to grille reinforcement, tightening to 30 inch-pounds.

4. Tighten screws securing grille tabs to left and right supports to 30 inch-pounds.

5. If car is equipped with Guide-Matic, position photosensor bellows on left rear of grille and secure with two screws and washers.

6. Close hood and check alignment of grille. Readjust as required.

4. Lower Grille (Fig. 13-7)

a. Removal

1. Remove one retainer securing air deflector to lower center bar and position out of way.

2. Remove bolts securing lower center support rod to bumper upper center bar and the lower center bar.

3. Remove two bolts securing each small bracket to lower grille and the lower center bar and remove both brackets.

4. Remove two screws securing lower grille to bumper upper center bar.

5. Remove two bolts securing lower grille to lower center bar.

6. Pull grille straight back then tip one end up and drop grille straight down and out of car.

b. Installation

1. Lift lower grille into position and secure to bumper upper center bar with two screws, tightening to 30 inch-pounds.

2. Make sure U-nuts are in place and install two bolts securing grille to lower center bar, tightening to 30 inch-pounds.

3. Make sure U-nuts are in place and secure lower center support rod to upper and lower center bars with two bolts, tightening to 60 inch-pounds.

4. Install two brackets and four U-nuts (two per bracket) on lower center bar and grille. Install two screws on each bracket tightening to 30 inch-pounds.

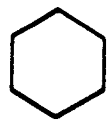
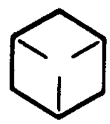
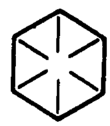
5. Allow air deflector to rest on lower center bar and secure to lower center bar with one retainer.

TORQUE SPECIFICATIONS

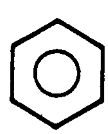
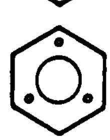
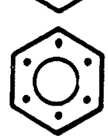
Material No.	Application	Thread Size	Torque
275M/1050-65	Lower Grille Angle Bracket to Lower Center Bar Screws	1/4-20	60 in. lb.
275M/1050-65	Angle Bracket to Lower Grille Screws	1/4-20	30 in. lb.
6010M/1008	Lower Grille to Bumper Center Bar Screws	1/4-14	30 in. lb.
275M	Upper Grille Reinforcement to Upper Grille Screws	1/4-20	30 in. lb.
6010M/1050-65	Upper Grille Reinforcement to Support Screws	1/4-20	60 in. lb.
275M	Upper Center Support Rod Screws	1/4-20	60 in. lb.
6010M/1050-65	Upper Grille Support Angle Bracket Screws	1/4-20	60 in. lb.
275M/1050-65	Lower Center Support Rod Screws	5/16-18	18 ft. lb.
286M	Radiator Cradle Mount Nuts	7/16-14	30 ft. lb.
280M	Radiator Cradle Outer Mounting Bracket to EA Bracket	3/8-16	30 ft. lb.
286M	Bumper Outer End Support Rod Nut (6L, 6F, 6Z)	3/8-16	18 ft. lb.
275M/1050	Radiator Cradle Cross Rod Screws	5/16-18	18 ft. lb.
275M/1050-65	Radiator Cradle Center Support Rod Screws	5/16-18	18 ft. lb.
6010/1050-65	Radiator Cover Strut Rod Screw	5/16-18	18 ft. lb.

BOLT AND NUT IDENTIFICATION

BOLT STEEL CLASSIFICATION

G. M. MATERIAL NO.	HEAD MARKING		STRENGTH
260-M		(None)	Standard
280-M		(120°)	Medium
300-M		(60°)	High

HEX-NUT STEEL CLASSIFICATION

G. M. MATERIAL NO.	MARKING			STRENGTH
Conventional Type				
286-M			(None)	Standard
301-M		 USUAL	(120°)	High
		 OPTIONAL	(120°)	
Prevailing Lock Type (Stover)				
A			(None)	Standard
B			(120°)	Medium
C			(60°)	High

DRILL SIZES

Letter Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches	Wire Gage Sizes	Drill Diam. Inches
Z	0.413	1	0.2280	28	0.1405	55	0.0520
Y	0.404	2	0.2210	29	0.1360	56	0.0465
X	0.397	3	0.2130	30	0.1285	57	0.0430
W	0.386	4	0.2090	31	0.1200	58	0.0420
V	0.377	5	0.2055	32	0.1160	59	0.0410
U	0.368	6	0.2040	33	0.1130	60	0.0400
T	0.358	7	0.2010	34	0.1110	61	0.0390
S	0.348	8	0.1990	35	0.1100	62	0.0380
R	0.339	9	0.1960	36	0.1065	63	0.0370
Q	0.332	10	0.1935	37	0.1040	64	0.0360
P	0.323	11	0.1910	38	0.1015	65	0.0350
O	0.316	12	0.1890	39	0.0995	66	0.0330
N	0.302	13	0.1850	40	0.0980	67	0.0320
M	0.295	14	0.1820	41	0.0960	68	0.0310
L	0.290	15	0.1800	42	0.0935	69	0.0292
K	0.281	16	0.1770	43	0.0890	70	0.0280
J	0.277	17	0.1730	44	0.0860	71	0.0260
I	0.272	18	0.1695	45	0.0820	72	0.0250
H	0.266	19	0.1660	46	0.0810	73	0.0240
G	0.261	20	0.1610	47	0.0785	74	0.0225
F	0.257	21	0.1590	48	0.0760	75	0.0210
E	0.250	22	0.1570	49	0.0730	76	0.0200
D	0.246	23	0.1540	50	0.0700	77	0.0180
C	0.242	24	0.1520	51	0.0670	78	0.0160
B	0.238	25	0.1495	52	0.0635	79	0.0145
A	0.234	26	0.1470	53	0.0595	80	0.0135
		27	0.1440	54	0.0550		

DECIMAL EQUIVALENTS

1/64	.015625	33/64	.515625
1/32	.03125	17/32	.53125
3/64	.046875	35/64	.546875
1/16	.0625	9/16	.5625
5/64	.078125	37/64	.578125
3/32	.09375	19/32	.59375
7/64	.109375	39/64	.609375
1/8	.125	5/8	.625
9/64	.140625	41/64	.640625
5/32	.15625	21/32	.65625
11/64	.171875	43/64	.671875
3/16	.1875	11/16	.6875
13/64	.203125	45/64	.703125
7/32	.21875	23/32	.71875
15/64	.234375	47/64	.734375
1/4	.25	3/4	.75
17/64	.265625	49/64	.765625
9/32	.28125	25/32	.78125
19/64	.296875	51/64	.796875
5/16	.3125	13/16	.8125
21/64	.328125	53/64	.828125
11/32	.34375	27/32	.84375
23/64	.359375	55/64	.859375
3/8	.375	7/8	.875
25/64	.390625	57/64	.890625
13/32	.40625	29/32	.90625
27/64	.421875	59/64	.921875
7/16	.4375	15/16	.9375
29/64	.453125	61/64	.953125
15/32	.46875	31/32	.96875
31/64	.484375	63/64	.984375
1/2	.5	1	

WEIGHTS AND MEASURES

LINEAR MEASURE

12 inches	= 1 foot
3 feet	= 1 yard (1 yd.)

AREA MEASURE

144 square inches	= 1 square foot
9 square feet	= 1 square yard (sq. yd.)

CUBIC MEASURE

1,728 cubic inches	= 1 cubic foot
27 cubic feet	= 1 cubic yard

LIQUID MEASURE

1 pint		= 16 ounces
2 pints	= 1 quart (qt.)	= 32 ounces
4 quarts	= 1 gallon (gal.)	
31 1/2 gallons	= 1 barrel (bbl.)	

COMMON WEIGHT

16 ounces	= 1 pound
100 pounds	= 1 hundred weight (cwt.)
2000 pounds	= 1 ton

METRIC EQUIVALENTS

Length

CM.	= 0.3937 in.	In.	= 2.5400 cm.
Meter	= 3.2808 ft.	Ft.	= 0.3048 m.
Meter	= 1.0936 yd.	Yd.	= 0.9144 m.
Km.	= 0.6214 mile	Mile	= 1.6093 km.

Area

Sq. cm.	= 0.1550 sq. in.	Sq. in.	= 6.4516 sq. cm.
Sq. m.	= 10.7639 sq. ft.	Sq. ft.	= 0.0929 sq. m.
Sq. m.	= 1.1960 sq. yd.	Sq. yd.	= 0.8361 sq. m.

Volume

Cu. cm.	= 0.0610 cu. in.	Cu. in.	= 16.3872 cu. cm.
Cu. m.	= 35.3145 cu. ft.	Cu. ft.	= 0.0283 cu. m.
Cu. m.	= 1.3079 cu. yd.	Cu. yd.	= 0.7646 cu. m.

Capacity

Liter	= 61.0250 cu. in.	Cu. in.	= 0.0164 liter
Liter	= 0.0353 cu. ft.	Cu. ft.	= 28.3162 liter
Liter	= 0.2642 gal. (U.S.)	Gal.	= 3.7853 liters
Liter	= 0.0284 bu. (U.S.)	Bu.	= 35.2383 liters

Liter = 100.027 cu. cm.; 1.0567 qt. (liquid) or 0.9081 qt. (dry); 2.2046 lb. of pure water at 4° C = 1 kg.

Weight

Gram	= 15.4324 grains	Grain	= 0.0648 g.
Gram	= 0.0353 oz.	Oz.	= 28.3495 g.
Kg.	= 2.2046 lb.	Lb.	= 0.4536 kg.
Kg.	= 0.0011 ton (sht.)	Ton (sht.)	= 907.1848 kg.
Ton (met.)	= 1.1023 ton (sht.)	Ton (sht.)	= 0.9072 ton (met.)
Ton (met.)	= 0.9842 ton (lg.)	Ton (lg.)	= 1.0160 ton (met.)

Pressure

1 kg. per sq. cm.	= 14.223 lb. per sq. in.
1 lb. per sq. in.	= 0.0703 kg. per sq. cm.
1 kg. per sq. m.	= 0.2048 lb. per sq. ft.
1 lb. per sq. ft.	= 4.8824 kg. per sq. m.
1 kg. per sq. cm.	= 0.9678 normal atmosphere

1 normal atmosphere = 1.0332 Kg. per sq. cm.; 1.0133 bars; 14.696 lb. per sq. in.; 29.92 inches of mercury

Temperature

Degrees Fahrenheit	= Degrees Centigrade x 9/5 +32
Degrees Centigrade	= Degrees Fahrenheit -32 x 5/9

SECTION 2
FRAME AND BODY MOUNTS

SECTION 3
FRONT SUSPENSION

FRONT SUSPENSION–ELDORADO

FRONT WHEEL DRIVE

SECTION 4
REAR SUSPENSION

REAR SUSPENSION (PROPELLER SHAFT)

REAR AXLE AND REAR AXLE ELDORADO

DIFFERENTIAL

SECTION 5
BRAKES

SECTION 6
ENGINE

ENGINE-COOLING

SECTION 8
FUEL AND EXHAUST SYSTEM

SECTION 9
STEERING

SECTION 10
WHEELS AND TIRES

SECTION 11
CHASSIS SHEET METAL

SECTION 12
CHASSIS ELECTRICAL

SECTION 13
RADIATOR AND GRILLE

SECTION 14
BUMPERS

SECTION 15
ELECTRICAL ACCESSORIES

B

D

E

F

G

H

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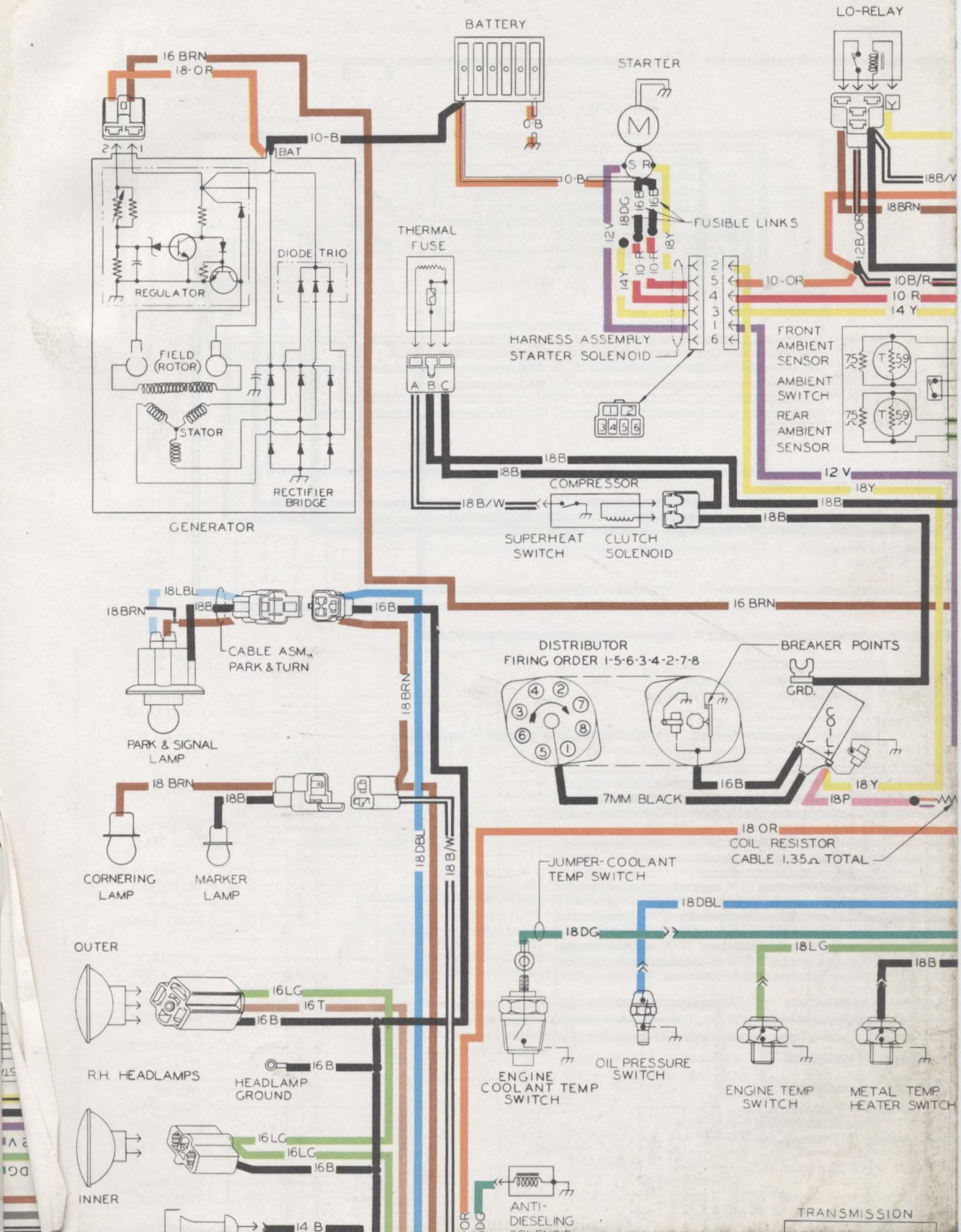
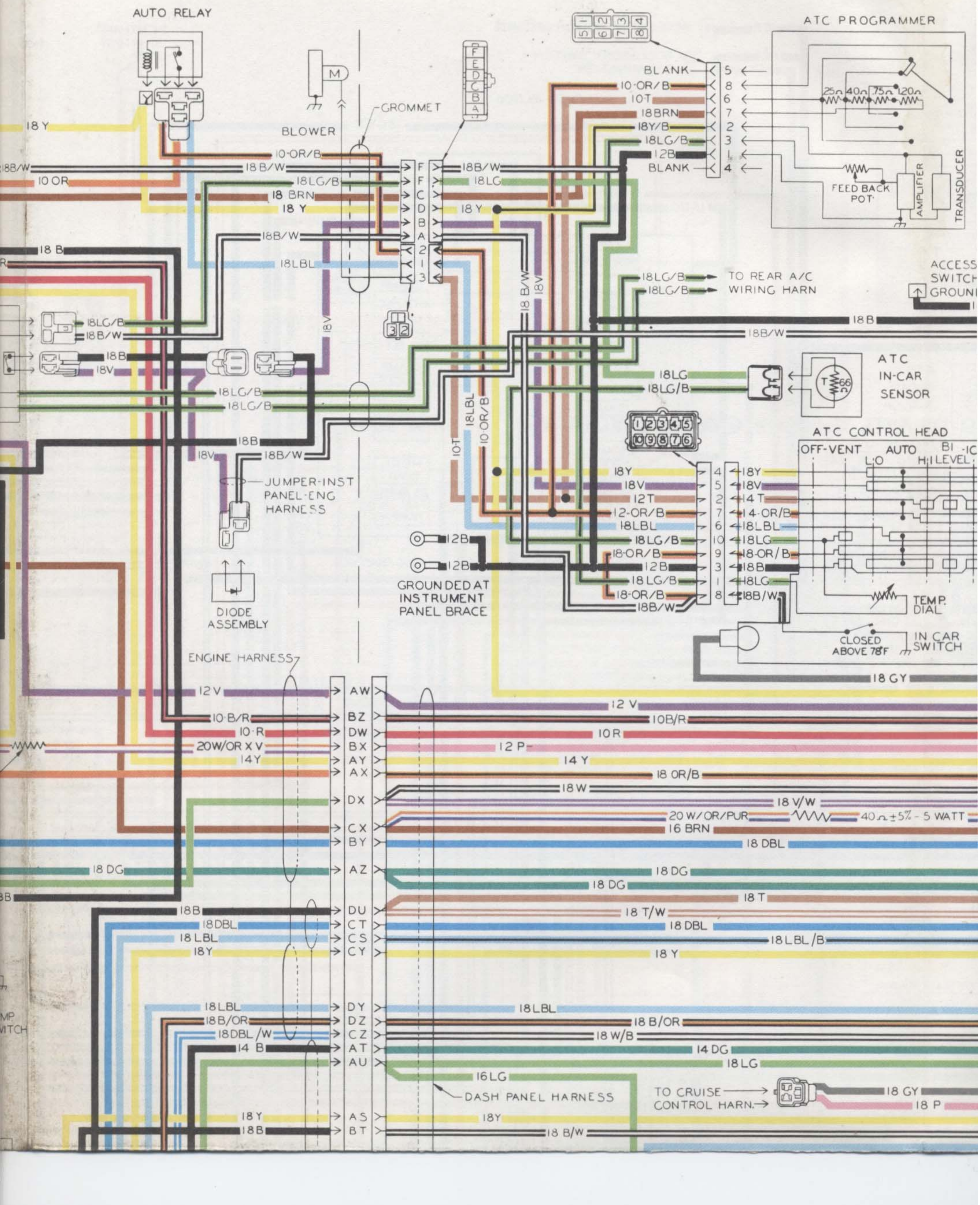
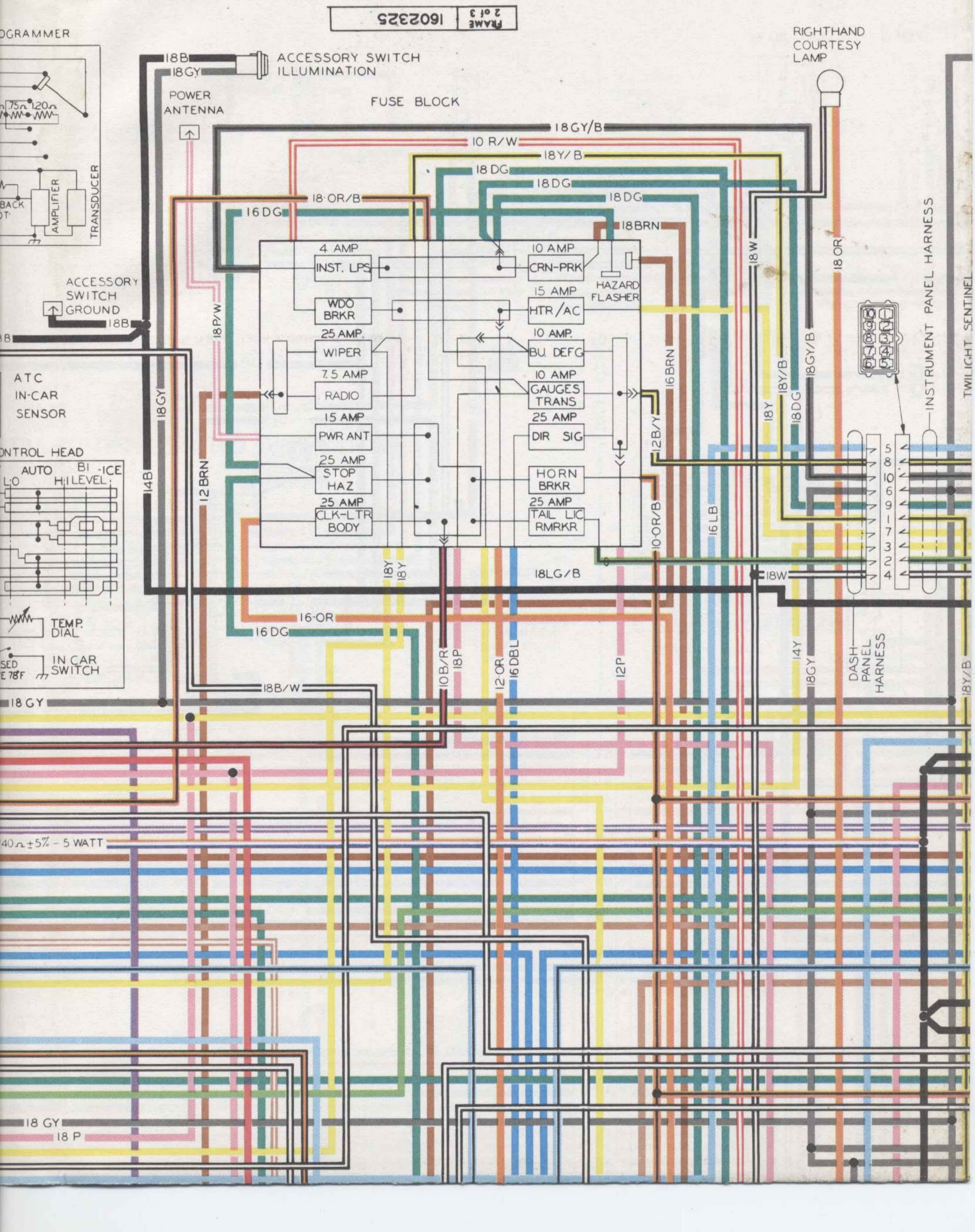
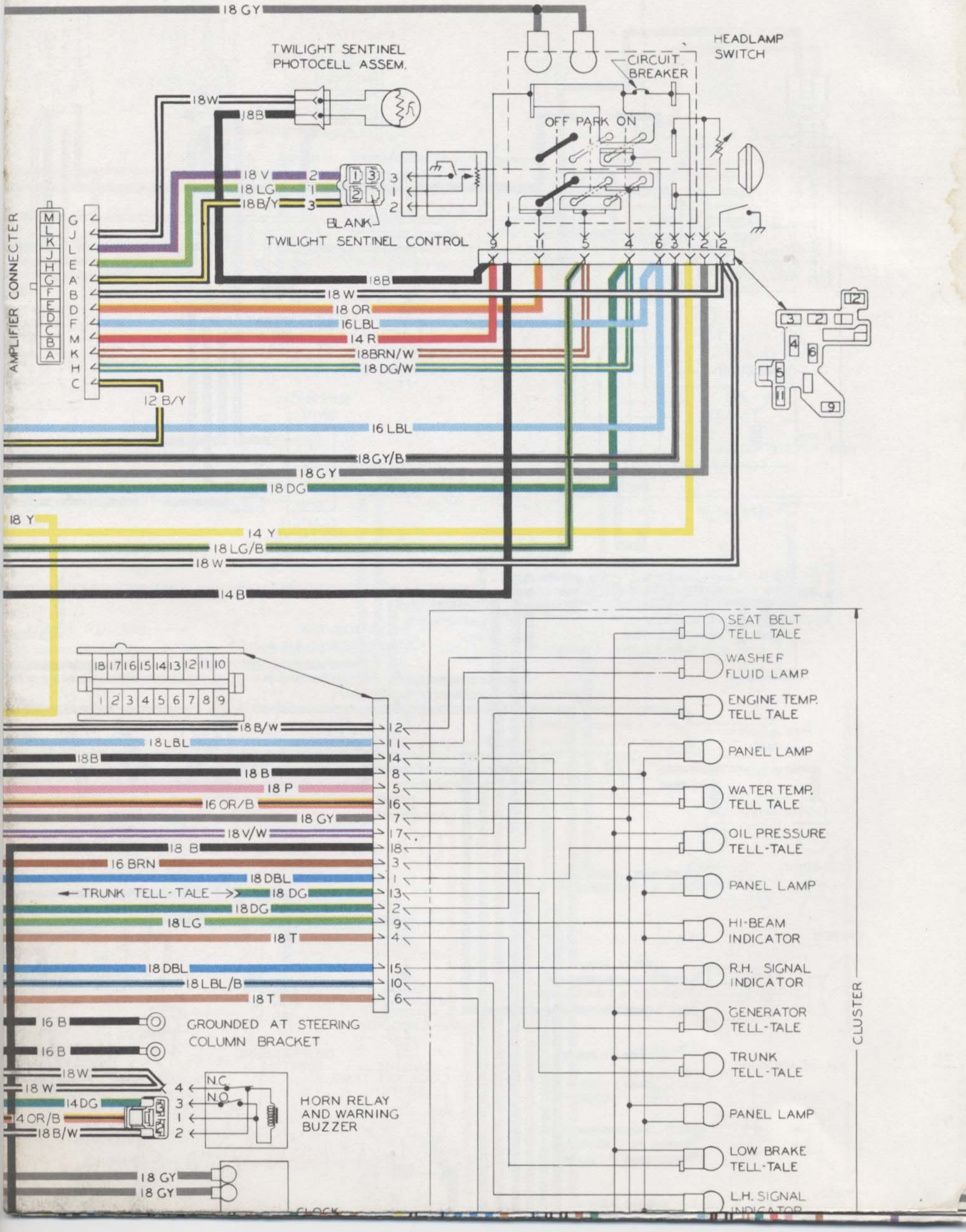
V



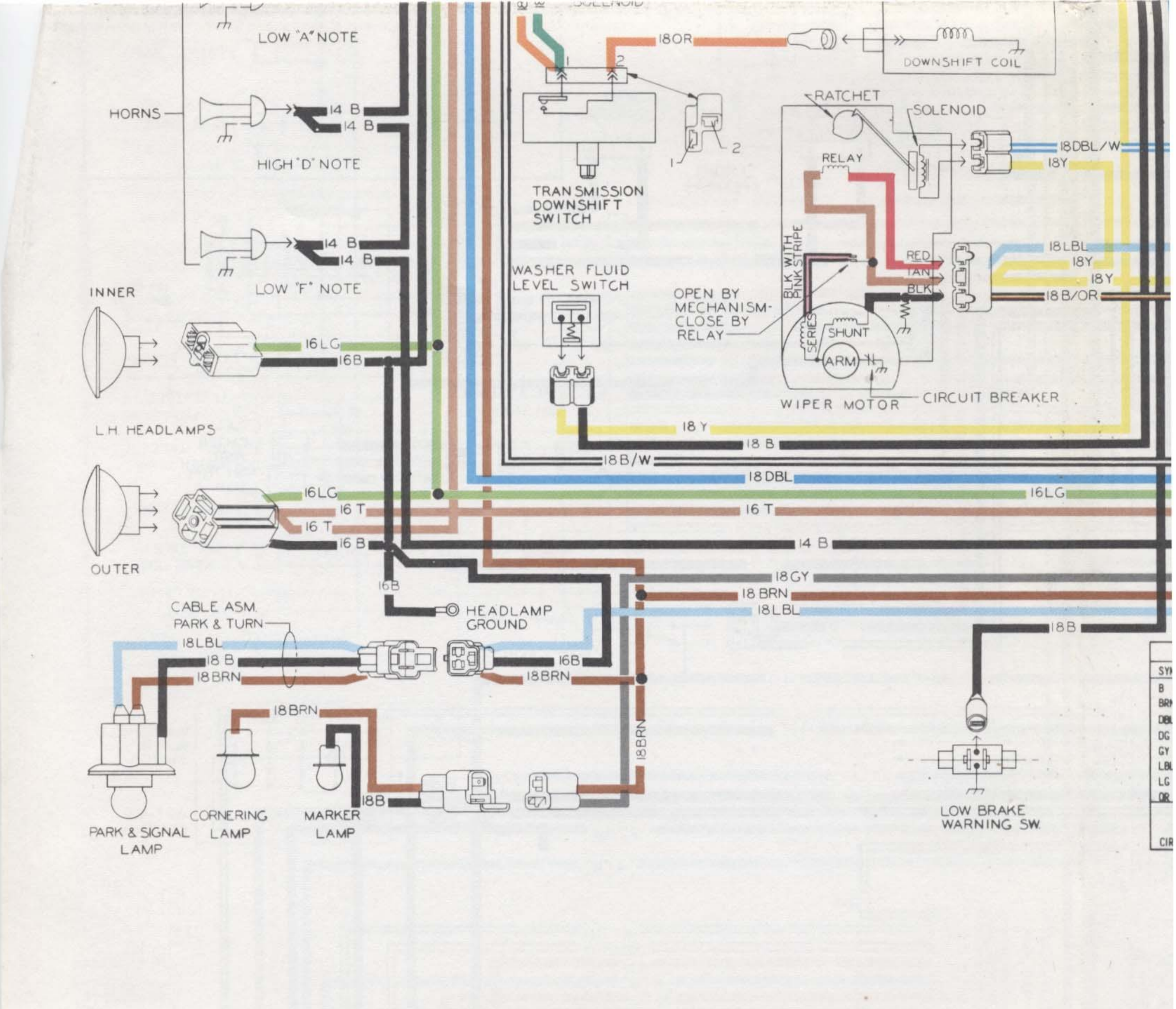
BATTERY
STARTER
LO-RELAY
16 BRN
18-OR
10-B
BAT
0-B
S R
12 V
18DG
16B
16B
18Y
FUSIBLE LINKS
10-R
10-R
14Y
10-OR
10B/R
10 R
14 Y
18B/W
18BRN
12B/OR
REGULATOR
DIODE TRIO
THERMAL FUSE
FIELD (ROTOR)
STATOR
RECTIFIER BRIDGE
GENERATOR
A B C
HARNESS ASSEMBLY STARTER SOLENOID
FRONT AMBIENT SENSOR
AMBIENT SWITCH
REAR AMBIENT SENSOR
18B
18B
18B/W
COMPRESSOR
SUPERHEAT SWITCH
CLUTCH SOLENOID
12 V
18Y
18B
18B
18LBL
18BRN
18B
16B
CABLE ASM. PARK & TURN
16 BRN
PARK & SIGNAL LAMP
18 BRN
DISTRIBUTOR
FIRING ORDER 1-5-6-3-4-2-7-8
BREAKER POINTS
GRD.
COIL
16B
7MM BLACK
18 Y
18P
18 BRN
18B
CORNERING LAMP
MARKER LAMP
18 DBL
18 B/W
18 OR
COIL RESISTOR CABLE 1.35Ω TOTAL
JUMPER-COOLANT TEMP SWITCH
18DBL
18DG
18LG
18B
OUTER
16LG
16T
16B
R.H. HEADLAMPS
16 B
HEADLAMP GROUND
ENGINE COOLANT TEMP SWITCH
OIL PRESSURE SWITCH
ENGINE TEMP SWITCH
METAL TEMP. HEATER SWITCH
16LG
16LG
16B
INNER
14 B
ANTI-DIESELING SOLENOID
TRANSMISSION


AUTO RELAY
BLOWER
GROMMET
ATC PROGRAMMER
BLANK
10-OR/B
10 T
18 BRN
18Y/B
18LG/B
12B
FEED BACK POT
AMPLIFIER
TRANSDUCER
TO REAR A/C WIRING HARN
ATC IN-CAR SENSOR
ATC CONTROL HEAD
OFF-VENT
AUTO
TEMP. DIAL
CLOSED ABOVE 78°F
IN CAR SWITCH
JUMPER-INST PANEL-ENG HARNESS
DIODE ASSEMBLY
GROUNDED AT INSTRUMENT PANEL BRACE
ENGINE HARNESS
DASH PANEL HARNESS
TO CRUISE CONTROL HARN.
40Ω ±5% - 5 WATT
20 W/OR/PUR
18 GY
18 P

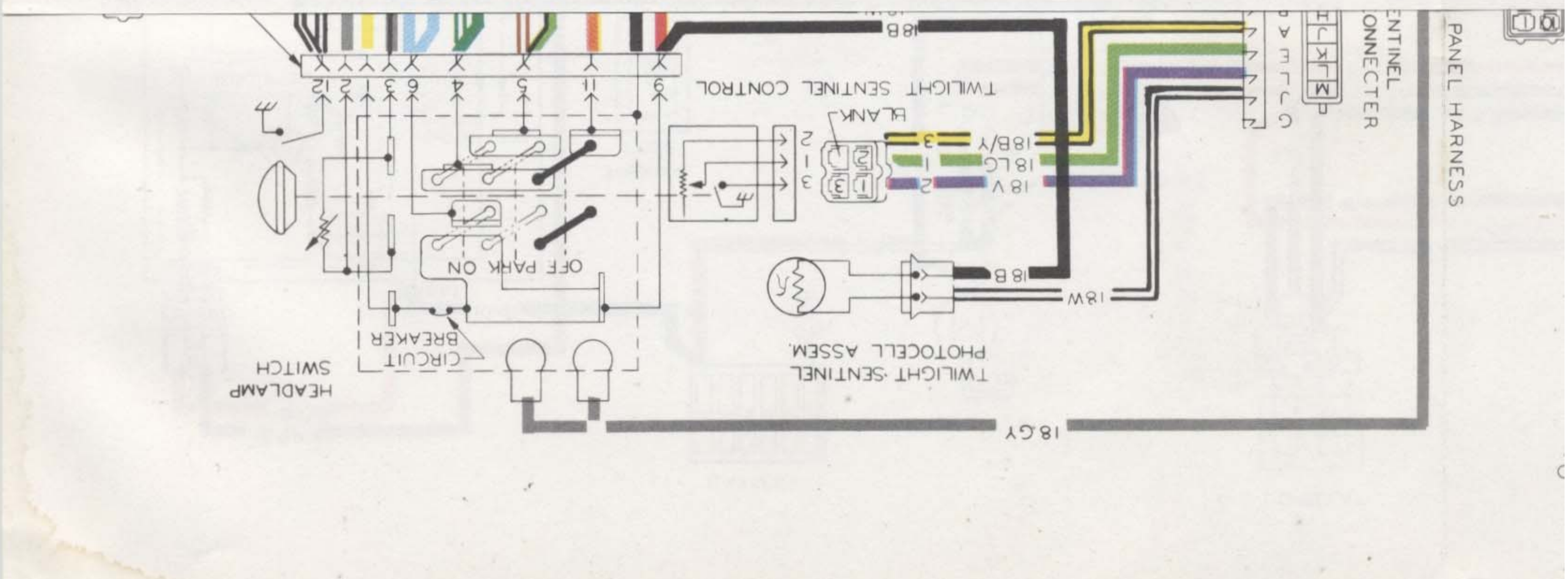

FRAME 2 of 3
1602325
OGRAMMER
18B
18GY
ACCESSORY SWITCH ILLUMINATION
POWER ANTENNA
FUSE BLOCK
RIGHTHAND COURTESY LAMP
18GY/B
10 R/W
18Y/B
18 DG
18 DG
18 DG
18·OR/B
16 DG
18 BRN
4 AMP
INST. LPS
10 AMP
CRN-PRK
HAZARD FLASHER
WDO BRKR
15 AMP
HTR/AC
25 AMP.
WIPER
10 AMP.
BU. DEFG
7.5 AMP
RADIO
10 AMP
GAUGES TRANS
15 AMP
PWR ANT
25 AMP
DIR SIG
25 AMP
STOP HAZ
HORN BRKR
25 AMP
CLK-LTR BODY
25 AMP
TAIL LIC RMRKR
ACCESSORY SWITCH GROUND
18B
ATC IN-CAR SENSOR
CONTROL HEAD
AUTO
LO
HI
BI LEVEL
ICE
TEMP. DIAL
IN CAR SWITCH
SED
E 78F
BACK
OT
AMPLIFIER
TRANSDUCER
75Ω
120Ω
18P/W
18GY
12BRN
14B
16BRN
12B/Y
10-OR/B
16LB
18W
18Y
18Y/B
18DG
18GY/B
18 OR
18W
18LG/B
18Y
18Y
16-OR
16 DG
18B/W
10B/R
18P
12-OR
16 DBL
12P
14Y
18GY
18 GY
40Ω ± 5% – 5 WATT
18 GY
18 P
DASH PANEL HARNESS
INSTRUMENT PANEL HARNESS
TWILIGHT SENTINEL
18Y/B
5
8
10
6
9
1
7
3
2
4



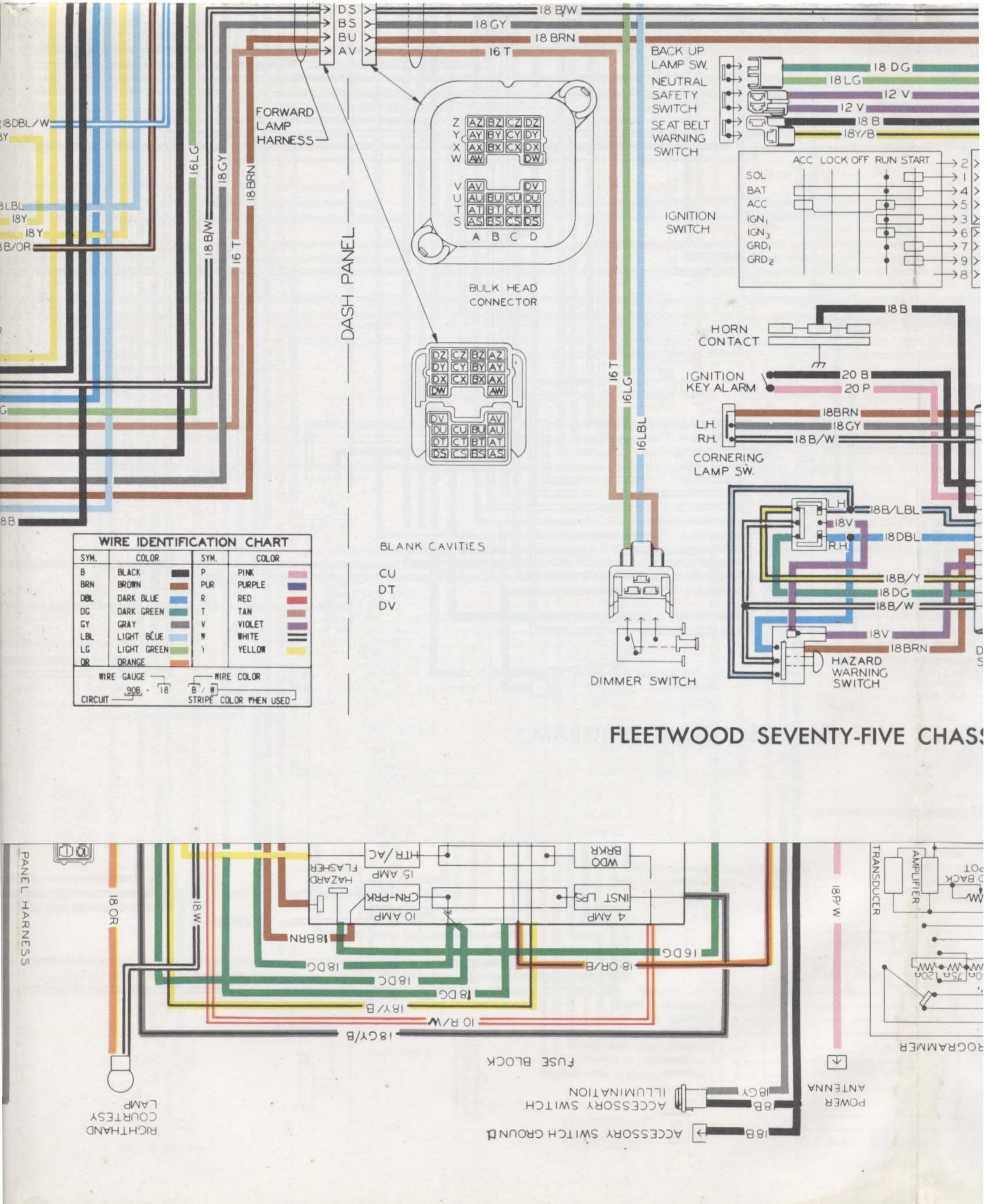
18 GY
TWILIGHT SENTINEL PHOTOCELL ASSEM.
HEADLAMP SWITCH
CIRCUIT BREAKER
OFF PARK ON
18 W
18 B
18 V
18 LG
18 B/Y
BLANK
TWILIGHT SENTINEL CONTROL
AMPLIFIER CONNECTER
18 OR
16 LBL
14 R
18 BRN/W
18 DG/W
12 B/Y
16 LBL
18 GY/B
18 GY
18 DG
18 Y
14 Y
18 LG/B
18 W
14 B
SEAT BELT TELL TALE
WASHER FLUID LAMP
ENGINE TEMP. TELL TALE
PANEL LAMP
WATER TEMP. TELL TALE
OIL PRESSURE TELL-TALE
PANEL LAMP
HI-BEAM INDICATOR
R.H. SIGNAL INDICATOR
GENERATOR TELL-TALE
TRUNK TELL-TALE
PANEL LAMP
LOW BRAKE TELL-TALE
L.H. SIGNAL INDICATOR
CLUSTER
18 B/W
18 LBL
18 B
18 B
18 P
16 OR/B
18 GY
18 V/W
18 B
16 BRN
18 DBL
TRUNK TELL-TALE
18 DG
18 DG
18 LG
18 T
18 DBL
18 LBL/B
18 T
16 B
16 B
GROUNDED AT STEERING COLUMN BRACKET
18 W
18 W
14 DG
14 OR/B
18 B/W
N.C.
N.O.
HORN RELAY AND WARNING BUZZER
18 GY
18 GY
CLOCK



SOLENOID
LOW "A" NOTE
HORNS
14 B
14 B
HIGH "D" NOTE
14 B
14 B
LOW "F" NOTE
INNER
16 LG
16B
L.H. HEADLAMPS
16LG
16 T
16 T
16 B
OUTER
16B
HEADLAMP GROUND
CABLE ASM. PARK & TURN
18LBL
18 B
18BRN
16B
18BRN
18BRN
18B
18BRN
PARK & SIGNAL LAMP
CORNERING LAMP
MARKER LAMP
18OR
DOWNSHIFT COIL
TRANSMISSION DOWNSHIFT SWITCH
1
2
RATCHET
SOLENOID
RELAY
18DBL/W
18Y
BLK WITH PINK STRIPE
RED
TAN
BLK
18LBL
18Y
18Y
18B/OR
WASHER FLUID LEVEL SWITCH
OPEN BY MECHANISM-CLOSE BY RELAY
SERIES
SHUNT
ARM
WIPER MOTOR
CIRCUIT BREAKER
18 Y
18 B
18B/W
18DBL
16LG
16 T
14 B
18GY
18 BRN
18LBL
18B
LOW BRAKE WARNING SW.



TWILIGHT SENTINEL CONTROL
BLANK
18B/Y
18LG
18V
18B
18W
OFF PARK ON
CIRCUIT BREAKER
HEADLAMP SWITCH
TWILIGHT-SENTINEL PHOTOCELL ASSEM.
18GY
PANEL HARNESS

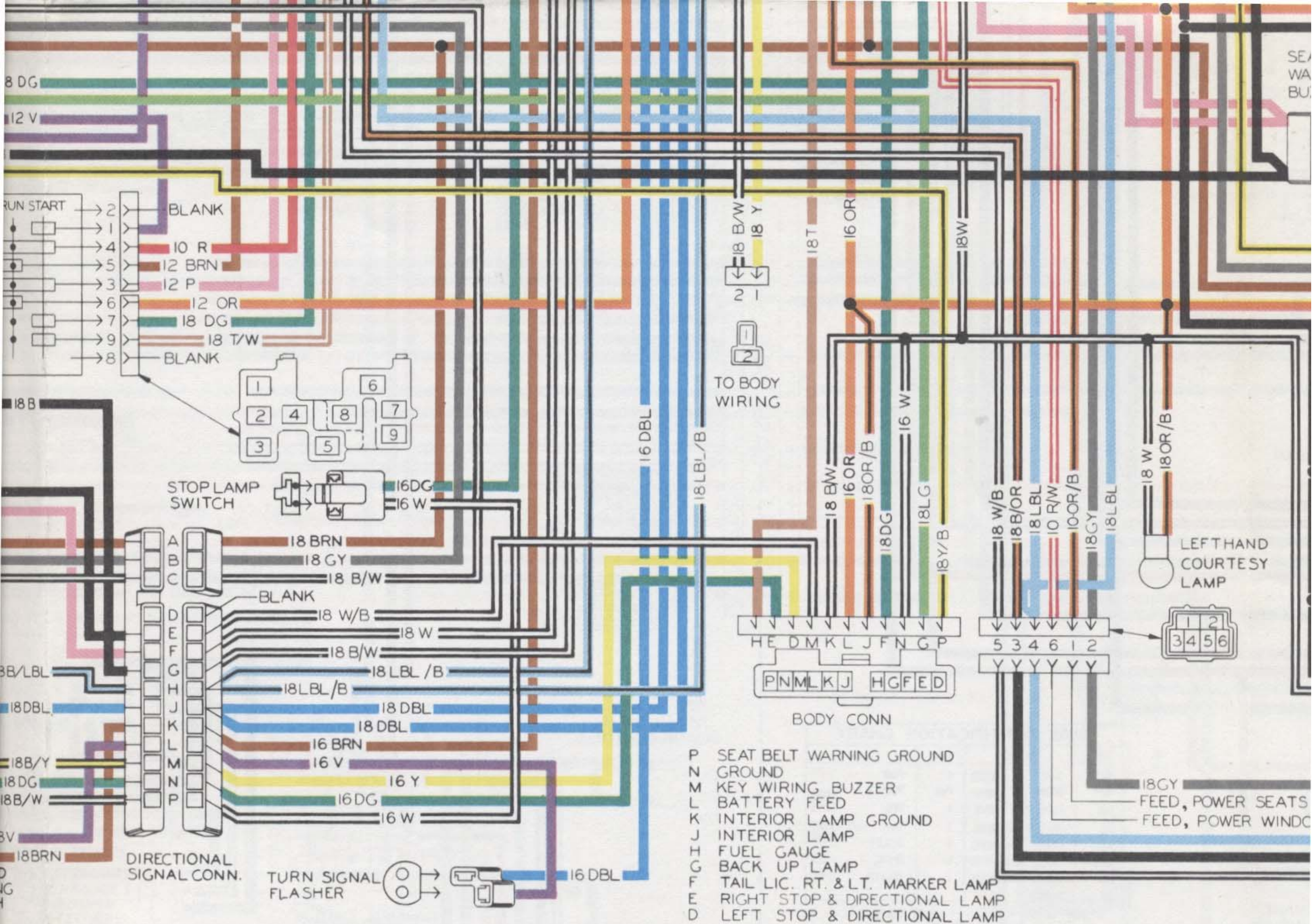


WIRE IDENTIFICATION CHART

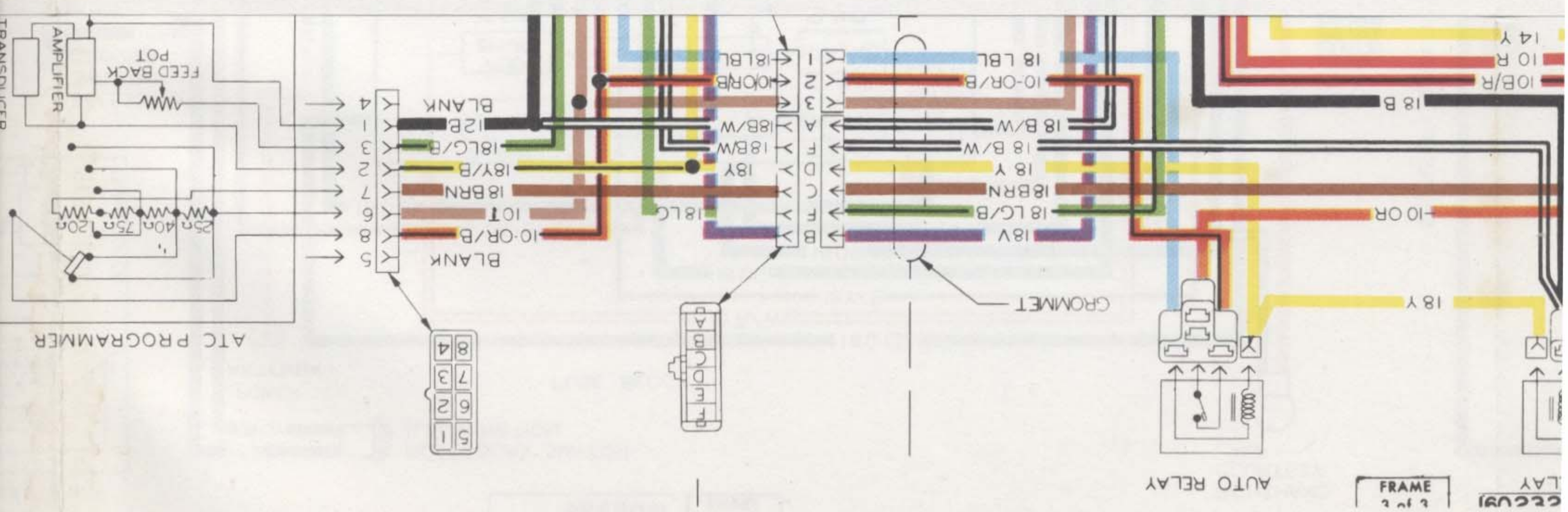
SYM.	COLOR	SYM.	COLOR
B	BLACK	P	PINK
BRN	BROWN	PUR	PURPLE
DBL	DARK BLUE	R	RED
DG	DARK GREEN	T	TAN
GY	GRAY	V	VIOLET
LBL	LIGHT BLUE	W	WHITE
LG	LIGHT GREEN	Y	YELLOW
OR	ORANGE		

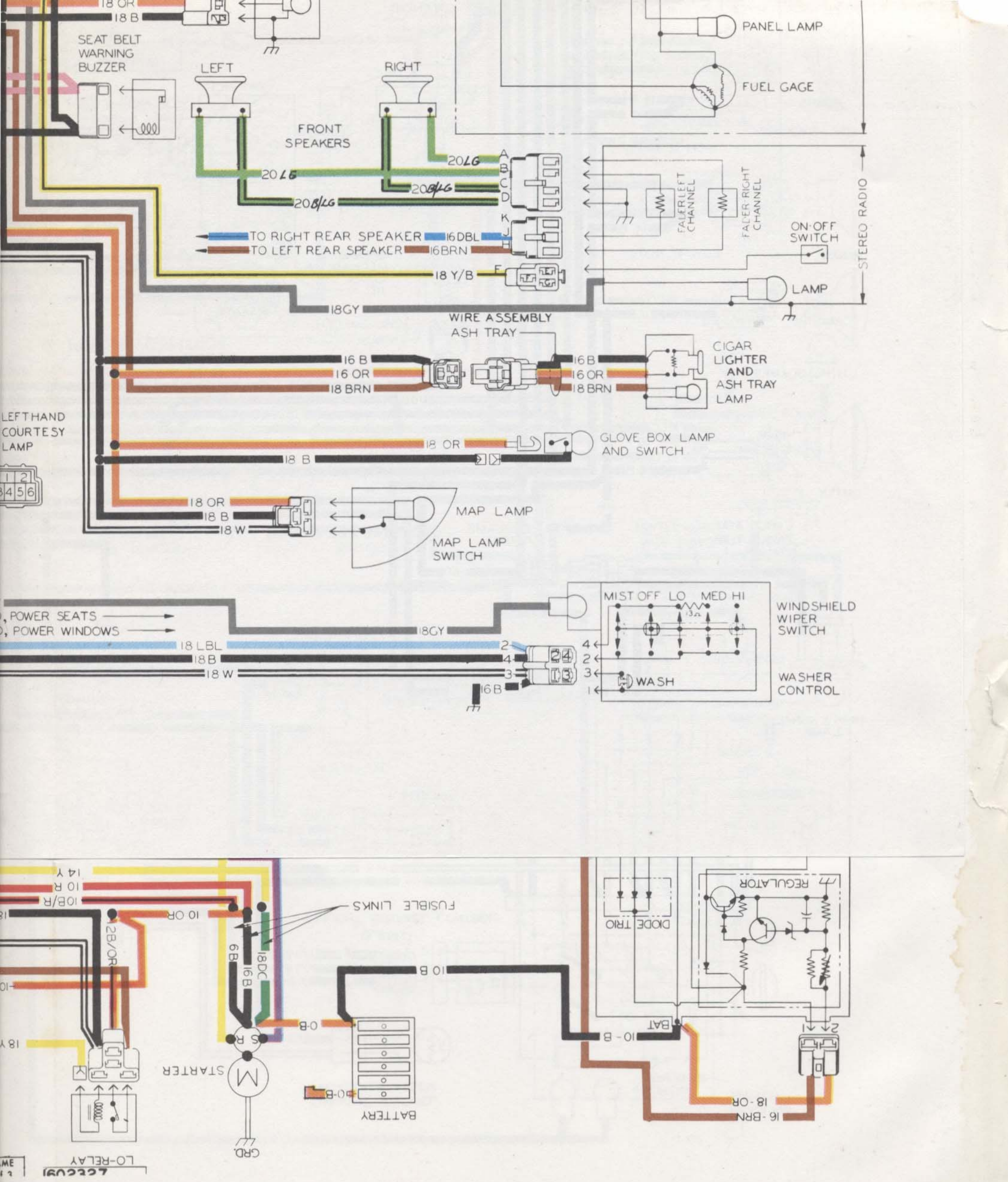
WIRE GAUGE — WIRE COLOR
90B - 18 B / W
CIRCUIT — STRIPE COLOR WHEN USED

FLEETWOOD SEVENTY-FIVE CHASS



VE CHASSIS CIRCUIT DIAGRAM



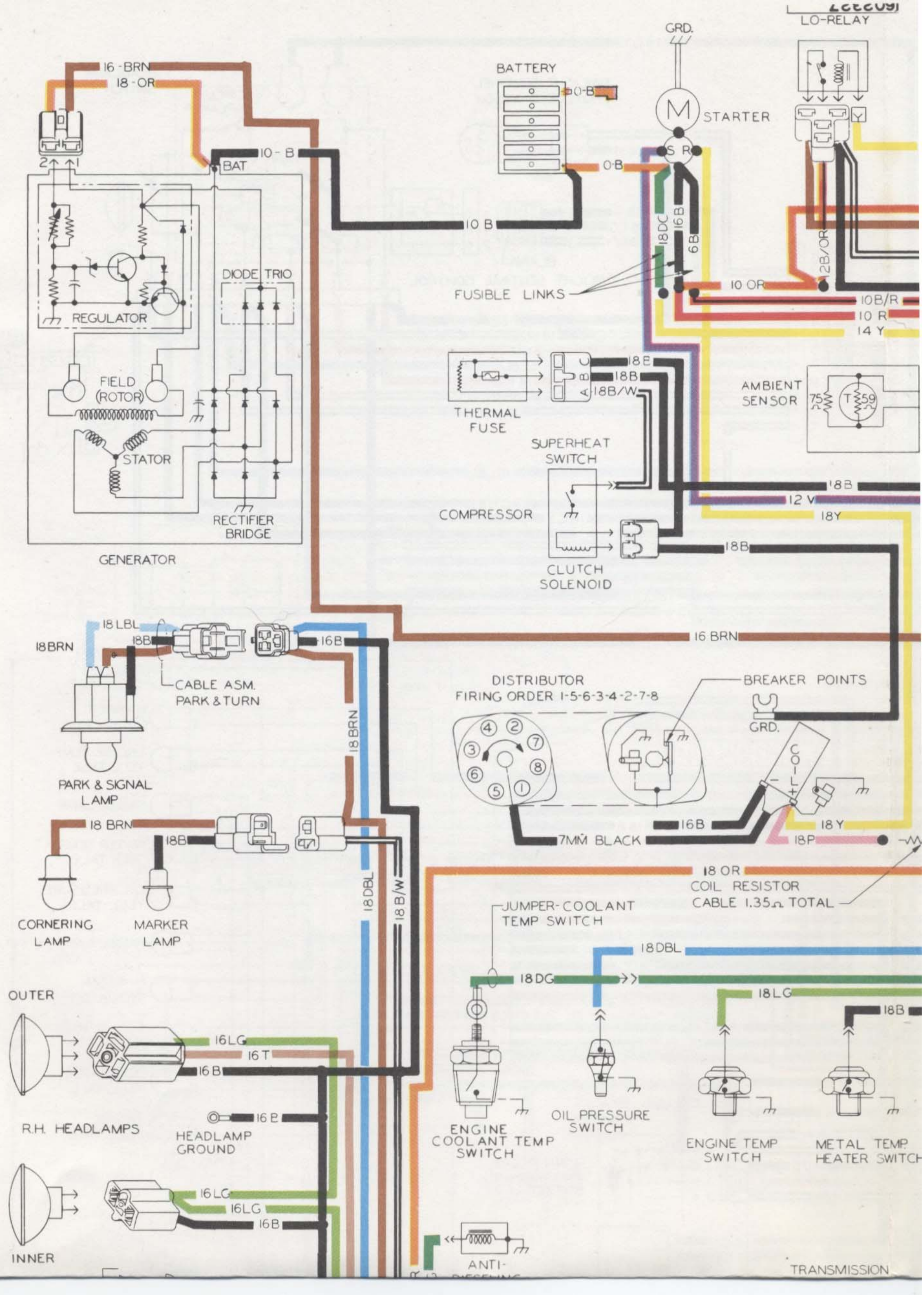

18 OR
18 B
SEAT BELT WARNING BUZZER
LEFT
RIGHT
FRONT SPEAKERS
PANEL LAMP
FUEL GAGE
20 LG
20 B/LG
A
B
C
D
K
J
E
FADER LEFT CHANNEL
FADER RIGHT CHANNEL
ON-OFF SWITCH
STEREO RADIO
TO RIGHT REAR SPEAKER
16 DBL
TO LEFT REAR SPEAKER
16 BRN
18 Y/B
LAMP
18 GY
WIRE ASSEMBLY ASH TRAY
16 B
16 OR
18 BRN
CIGAR LIGHTER AND ASH TRAY LAMP
LEFT HAND COURTESY LAMP
18 OR
18 B
GLOVE BOX LAMP AND SWITCH
18 W
MAP LAMP
MAP LAMP SWITCH
POWER SEATS
POWER WINDOWS
18 GY
18 LBL
MIST OFF LO MED HI
13Ω
WINDSHIELD WIPER SWITCH
WASH
WASHER CONTROL
16 B
14 Y
10 R
10 B/R
10 OR
12 B/OR
FUSIBLE LINKS
6 B
16 B
18 DC
10 B
0-B
S R
STARTER
BATTERY
GRD.
LO-RELAY
18 Y
DIODE TRIO
REGULATOR
BAT
10-B
18-OR
16-BRN
1
2
602327

WIRE IDENTIFICATION CHART

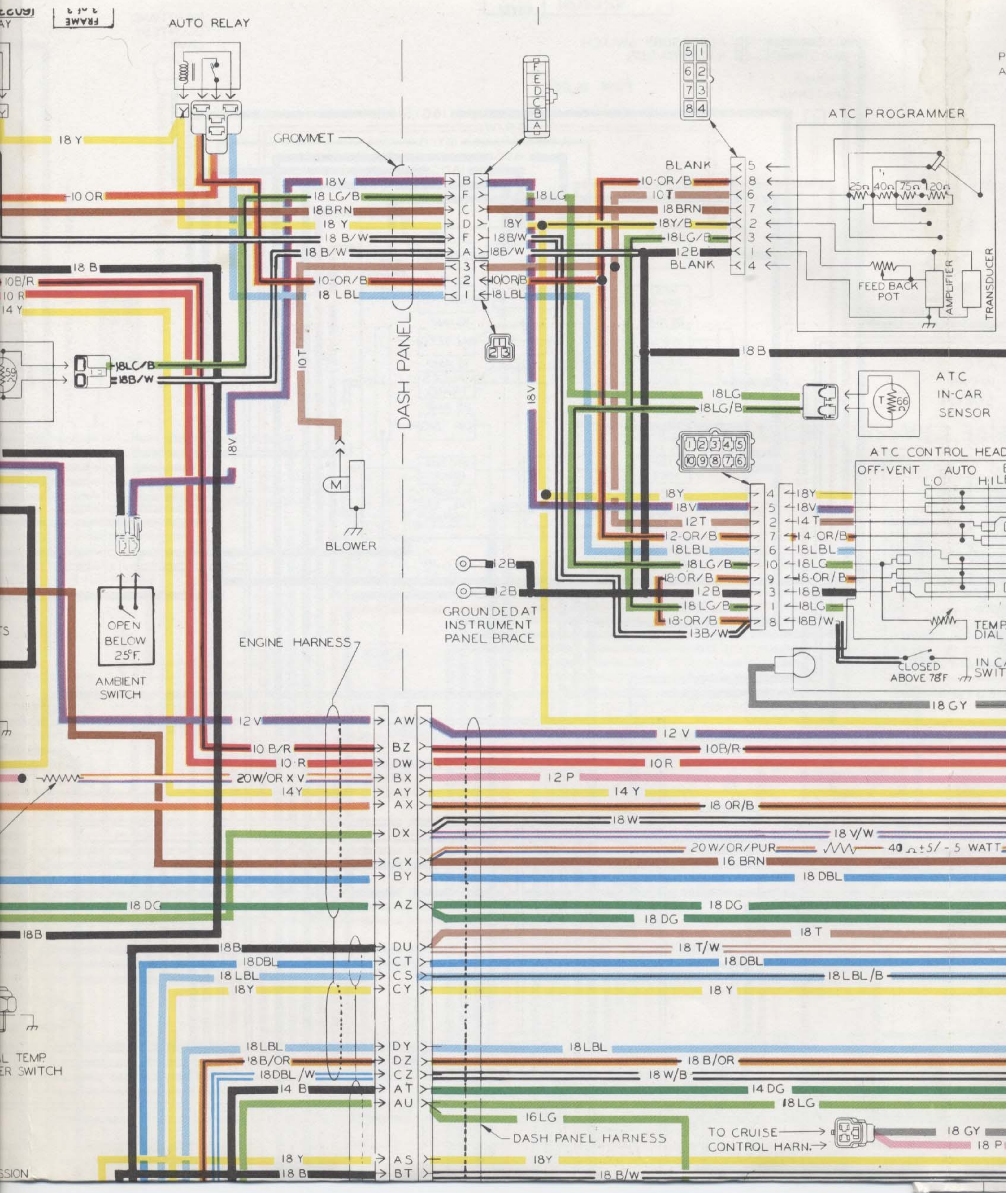
SYM.	COLOR	SYM.	COLOR
B	BLACK	P	PINK
BRN	BROWN	PUR	PURPLE
DBL	DARK BLUE	R	RED
DG	DARK GREEN	T	TAN
GY	GRAY	V	VIOLET
LBL	LIGHT BLUE	W	WHITE
LG	LIGHT GREEN	Y	YELLOW
OR	ORANGE		

WIRE GAUGE — 908 - 18 — CIRCUIT; WIRE COLOR — B / W — STRIPE COLOR WHEN USED

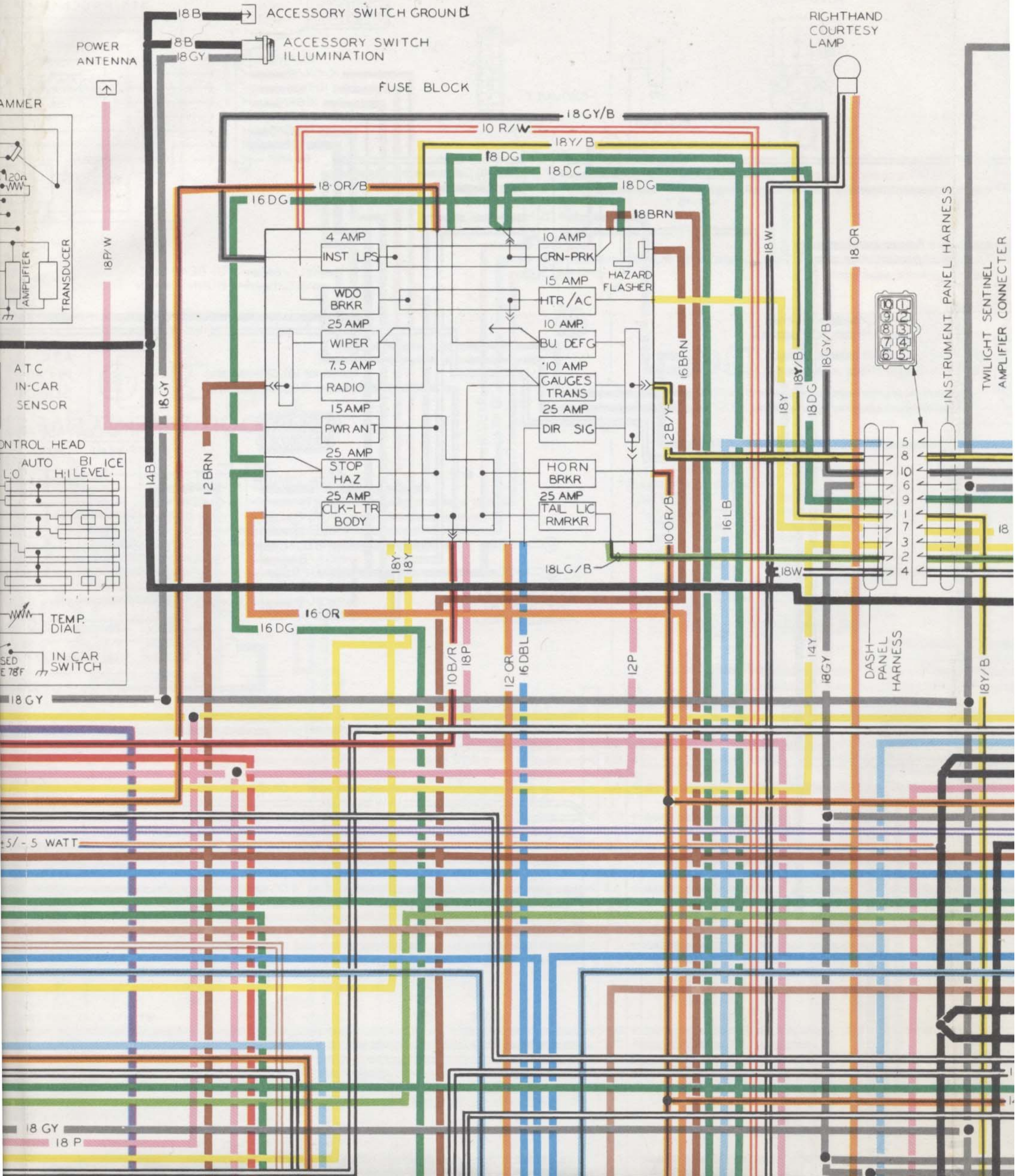
FLEETWOOD SEVENTY-FIVE CHASSIS CIRCUIT DIAGRAM



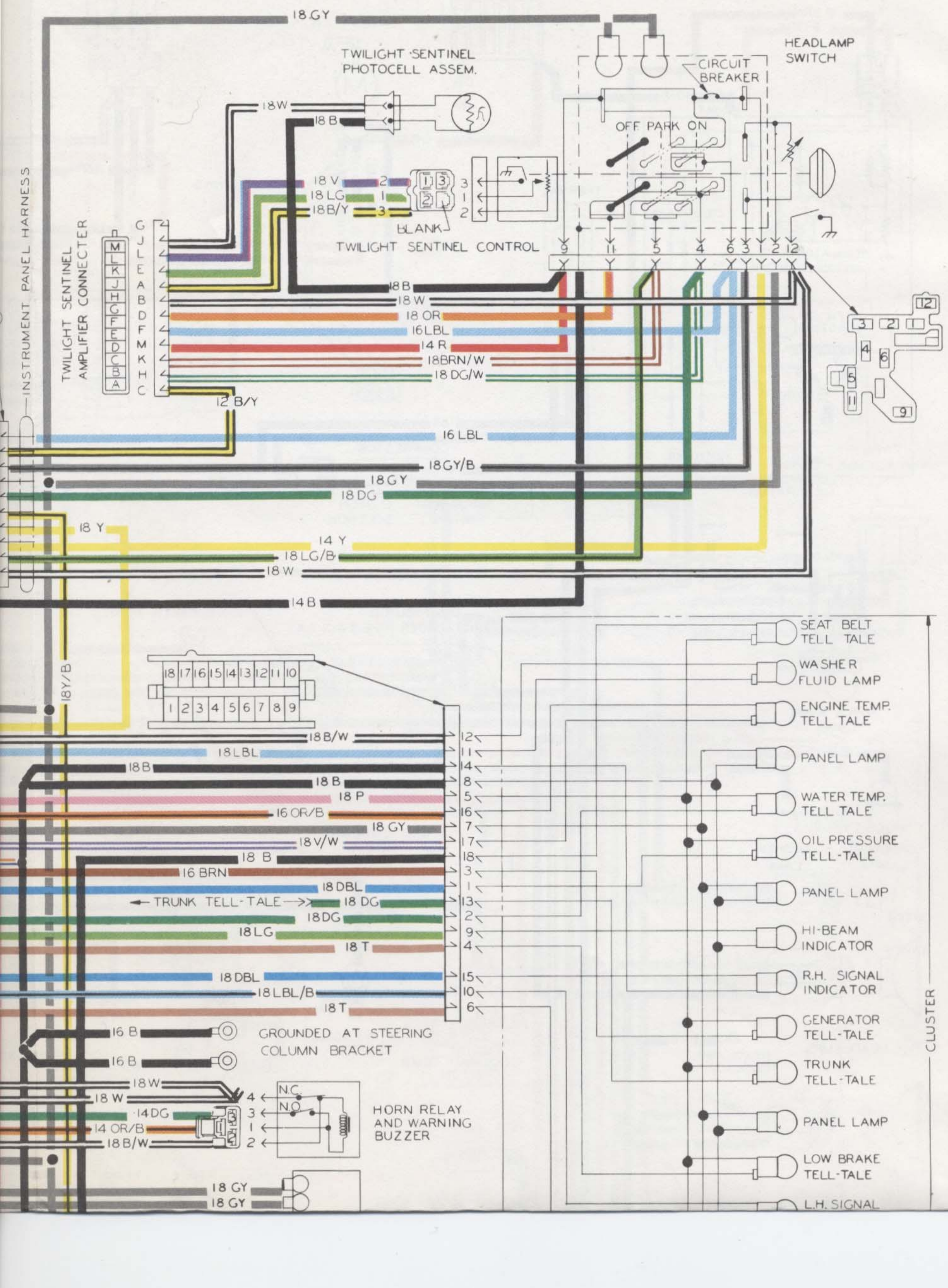
LO-RELAY
GRD.
BATTERY
STARTER
16-BRN
18-OR
10-B
BAT
0-B
10 B
DIODE TRIO
REGULATOR
FIELD (ROTOR)
STATOR
RECTIFIER BRIDGE
GENERATOR
18DG
16B
6B
12B/OR
10 OR
10B/R
10 R
14 Y
FUSIBLE LINKS
THERMAL FUSE
18B
18B/W
AMBIENT SENSOR
SUPERHEAT SWITCH
COMPRESSOR
CLUTCH SOLENOID
12 V
18Y
16 BRN
18 LBL
18BRN
CABLE ASM. PARK & TURN
PARK & SIGNAL LAMP
DISTRIBUTOR
FIRING ORDER 1-5-6-3-4-2-7-8
BREAKER POINTS
COIL
7MM BLACK
18P
18 OR
COIL RESISTOR CABLE 1.35Ω TOTAL
18 BRN
CORNERING LAMP
MARKER LAMP
18 DBL
18 B/W
JUMPER-COOLANT TEMP SWITCH
18DBL
18DG
18LG
OUTER
16LG
16 T
R.H. HEADLAMPS
HEADLAMP GROUND
ENGINE COOLANT TEMP SWITCH
OIL PRESSURE SWITCH
ENGINE TEMP SWITCH
METAL TEMP. HEATER SWITCH
INNER
ANTI-
TRANSMISSION

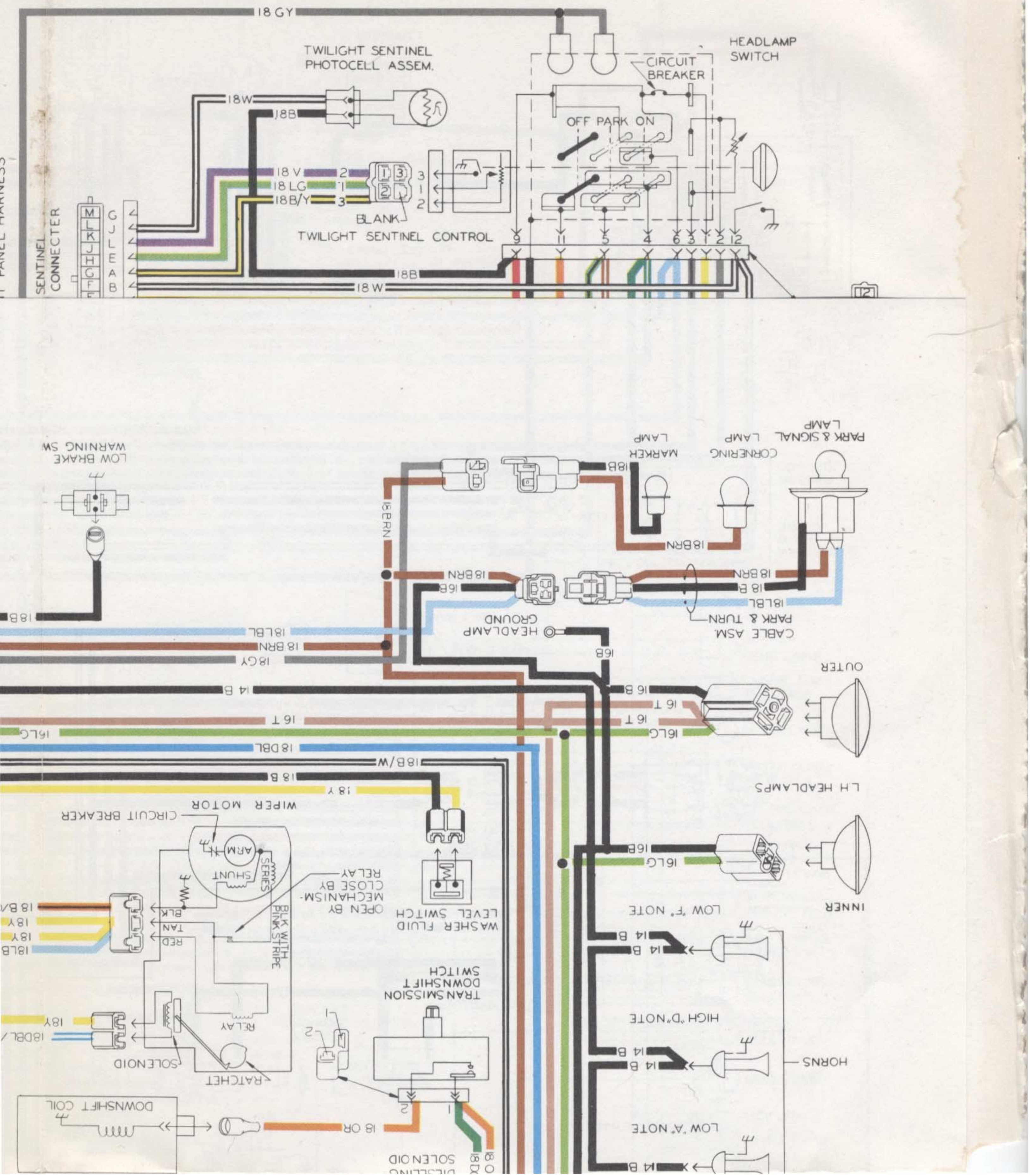


AUTO RELAY
FRAME
GROMMET
DASH PANEL
ATC PROGRAMMER
BLANK
FEED BACK POT
AMPLIFIER
TRANSDUCER
ATC IN-CAR SENSOR
ATC CONTROL HEAD
OFF-VENT
AUTO
LO
HI
TEMP DIAL
BLOWER
GROUNDED AT INSTRUMENT PANEL BRACE
ENGINE HARNESS
OPEN BELOW 25°F.
AMBIENT SWITCH
CLOSED ABOVE 78°F
DASH PANEL HARNESS
TO CRUISE CONTROL HARN.
L TEMP
ER SWITCH
SSION
18 Y
10 OR
18 B
10B/R
10 R
14 Y
18LC/B
18B/W
18V
18 LG/B
18BRN
18 B/W
10-OR/B
18 LBL
10T
18LG
18Y/B
18LG/B
12B
18 B
18LG
18Y
18V
12T
14 T
12-OR/B
14 OR/B
18LBL
18-OR/B
13B/W
18 GY
12 V
10 B/R
10 R
20W/OR X V
12 P
14Y
18 OR/B
18 W
18 V/W
20 W/OR/PUR
40 Ω ±5/ - 5 WATT
16 BRN
18 DBL
18 DG
18 T
18 T/W
18LBL/B
18B/OR
18DBL/W
18 W/B
14 B
14 DG
16LG
18 B/W
AW
BZ
DW
BX
AY
AX
DX
CX
BY
AZ
DU
CT
CS
CY
DY
DZ
CZ
AT
AU
AS
BT

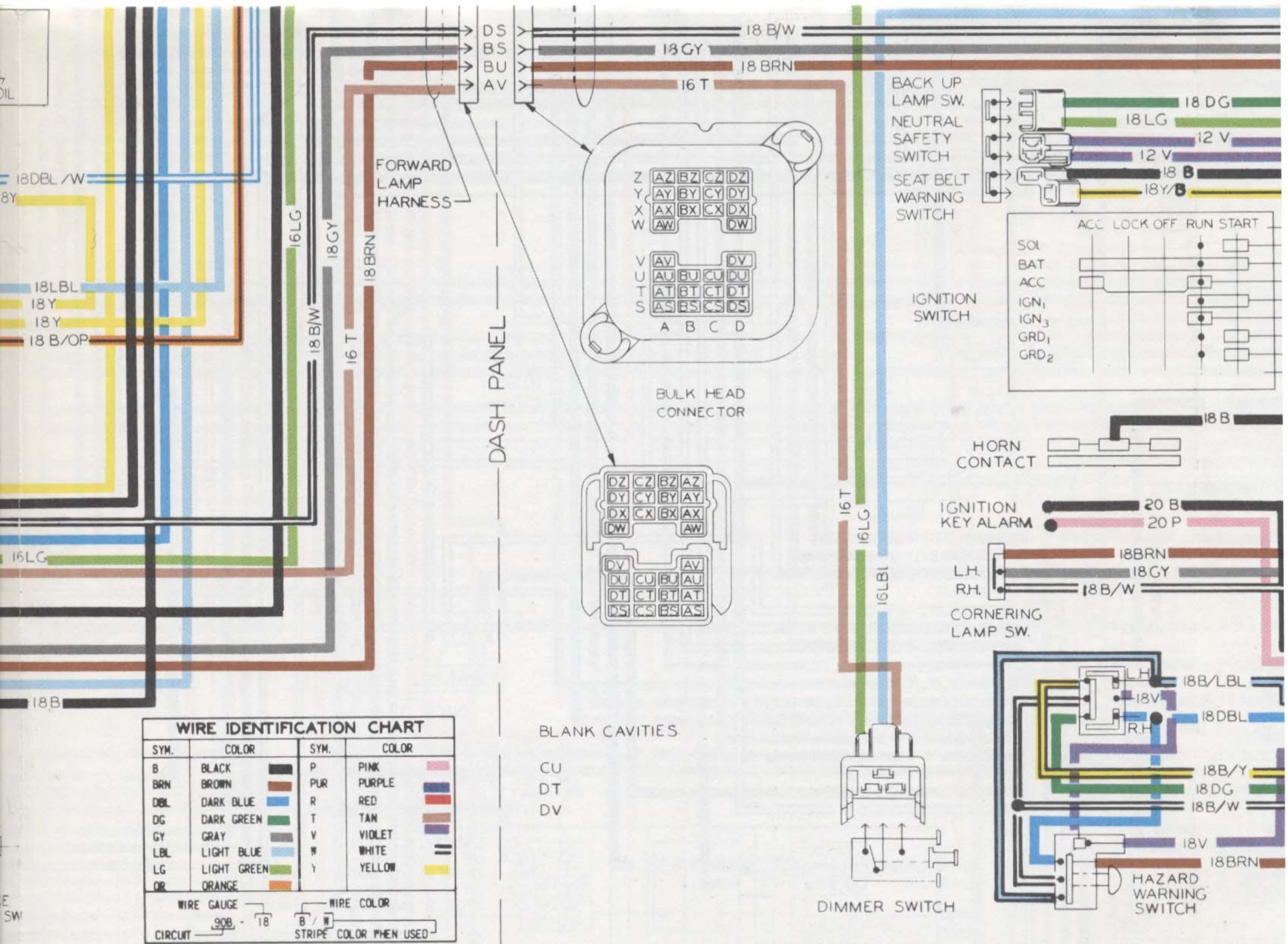


ACCESSORY SWITCH GROUND
ACCESSORY SWITCH ILLUMINATION
POWER ANTENNA
RIGHTHAND COURTESY LAMP
FUSE BLOCK
AMMER
TRANSDUCER
AMPLIFIER
A.T.C IN-CAR SENSOR
ONTROL HEAD
AUTO
LO
HI
BI LEVEL
ICE
TEMP. DIAL
IN CAR SWITCH
4 AMP
INST LPS
WDO BRKR
25 AMP
WIPER
7.5 AMP
RADIO
15 AMP
PWR ANT
25 AMP
STOP HAZ
25 AMP
CLK-LTR BODY
10 AMP
CRN-PRK
HAZARD FLASHER
15 AMP
HTR/AC
10 AMP.
BU. DEFG
10 AMP
GAUGES TRANS
25 AMP
DIR SIG
HORN BRKR
25 AMP
TAIL LIC RMRKR
INSTRUMENT PANEL HARNESS
TWILIGHT SENTINEL AMPLIFIER CONNECTER
DASH PANEL HARNESS
18 B
18 GY
18 GY/B
10 R/W
18 Y/B
18 DG
18 OR/B
16 DG
18 BRN
18 W
18 OR
18 GY/B
18 Y/B
18 DG
18 Y
16 BRN
12 B/Y
16 LB
10 OR/B
18 LG/B
18 P/W
14 B
12 BRN
16 OR
10 B/R
18 P
12 OR
16 DBL
12 P
14 Y
18 GY
18 Y/B
±5/-5 WATT
18 P


TWILIGHT SENTINEL PHOTOCELL ASSEM.
HEADLAMP SWITCH
CIRCUIT BREAKER
OFF PARK ON
BLANK
TWILIGHT SENTINEL CONTROL
TWILIGHT SENTINEL AMPLIFIER CONNECTER
INSTRUMENT PANEL HARNESS
18 GY
18 W
18 B
18 V
18 LG
18 B/Y
18 OR
16 LBL
14 R
18 BRN/W
18 DG/W
12 B/Y
18 GY/B
18 DG
18 Y
14 Y
18 LG/B
14 B
18 Y/B
18 B/W
18 LBL
18 P
16 OR/B
18 V/W
16 BRN
18 DBL
TRUNK TELL-TALE
18 T
18 LBL/B
16 B
GROUNDED AT STEERING COLUMN BRACKET
14 DG
14 OR/B
N.C.
N.O.
HORN RELAY AND WARNING BUZZER
SEAT BELT TELL TALE
WASHER FLUID LAMP
ENGINE TEMP. TELL TALE
PANEL LAMP
WATER TEMP. TELL TALE
OIL PRESSURE TELL-TALE
PANEL LAMP
HI-BEAM INDICATOR
R.H. SIGNAL INDICATOR
GENERATOR TELL-TALE
TRUNK TELL-TALE
PANEL LAMP
LOW BRAKE TELL-TALE
L.H. SIGNAL
CLUSTER



18 GY
HEADLAMP SWITCH
TWILIGHT SENTINEL PHOTOCELL ASSEM.
CIRCUIT BREAKER
18W
18B
OFF PARK ON
18 V
18 LG
18B/Y
BLANK
TWILIGHT SENTINEL CONTROL
SENTINEL CONNECTER
18B
18 W
PARK & SIGNAL LAMP
CORNERING LAMP
MARKER LAMP
LOW BRAKE WARNING SW
18 BRN
18 B
18 LBL
16 B
PARK & TURN CABLE ASM.
HEADLAMP GROUND
18 GY
14 B
16 B
16 T
16 LG
18 DBL
18 B/W
18 Y
OUTER
LH HEADLAMPS
INNER
WIPER MOTOR
CIRCUIT BREAKER
ARM
SHUNT
SERIES
OPEN BY MECHANISM-CLOSE BY RELAY
BLK WITH PINK STRIPE
WASHER FLUID LEVEL SWITCH
LOW "F" NOTE
HIGH "D" NOTE
HORNS
LOW "A" NOTE
TRANSMISSION DOWNSHIFT SWITCH
RELAY
SOLENOID
RATCHET
DOWNSHIFT COIL
18 OR

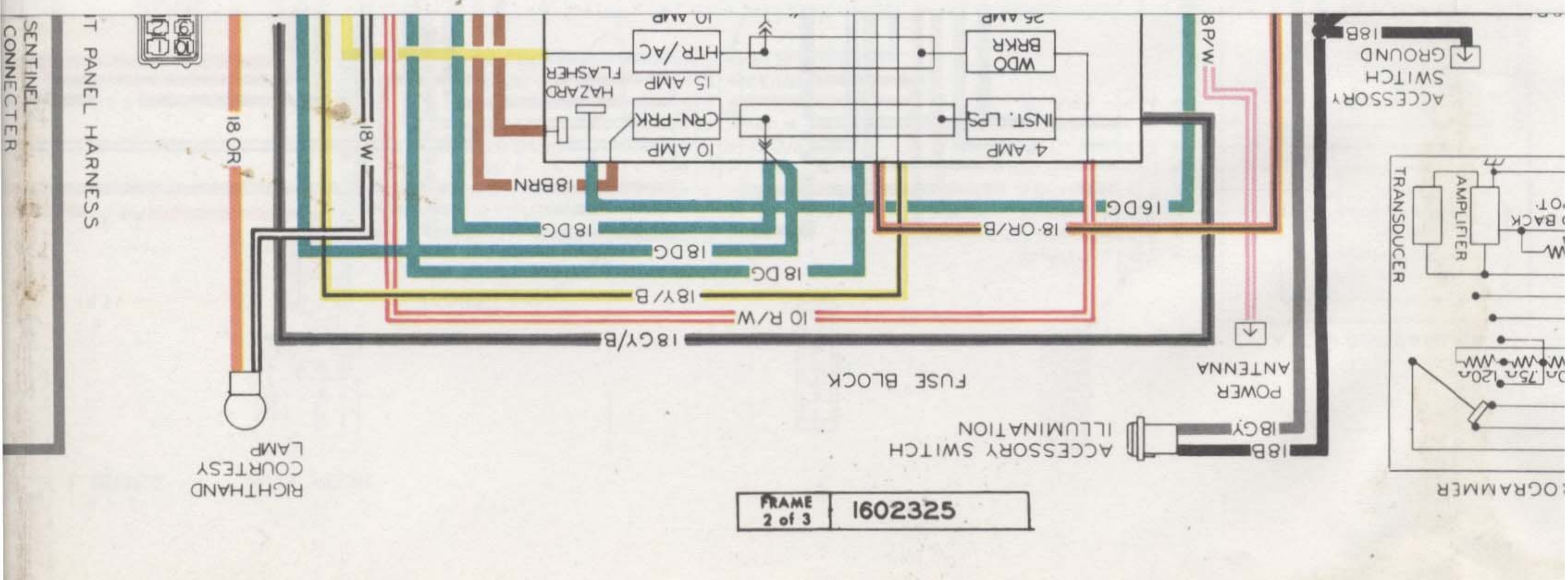


SYM.	COLOR	SYM.	COLOR
B	BLACK	P	PINK
BRN	BROWN	PUR	PURPLE
DBL	DARK BLUE	R	RED
DG	DARK GREEN	T	TAN
GY	GRAY	V	VIOLET
LBL	LIGHT BLUE	W	WHITE
LG	LIGHT GREEN	Y	YELLOW
OR	ORANGE		

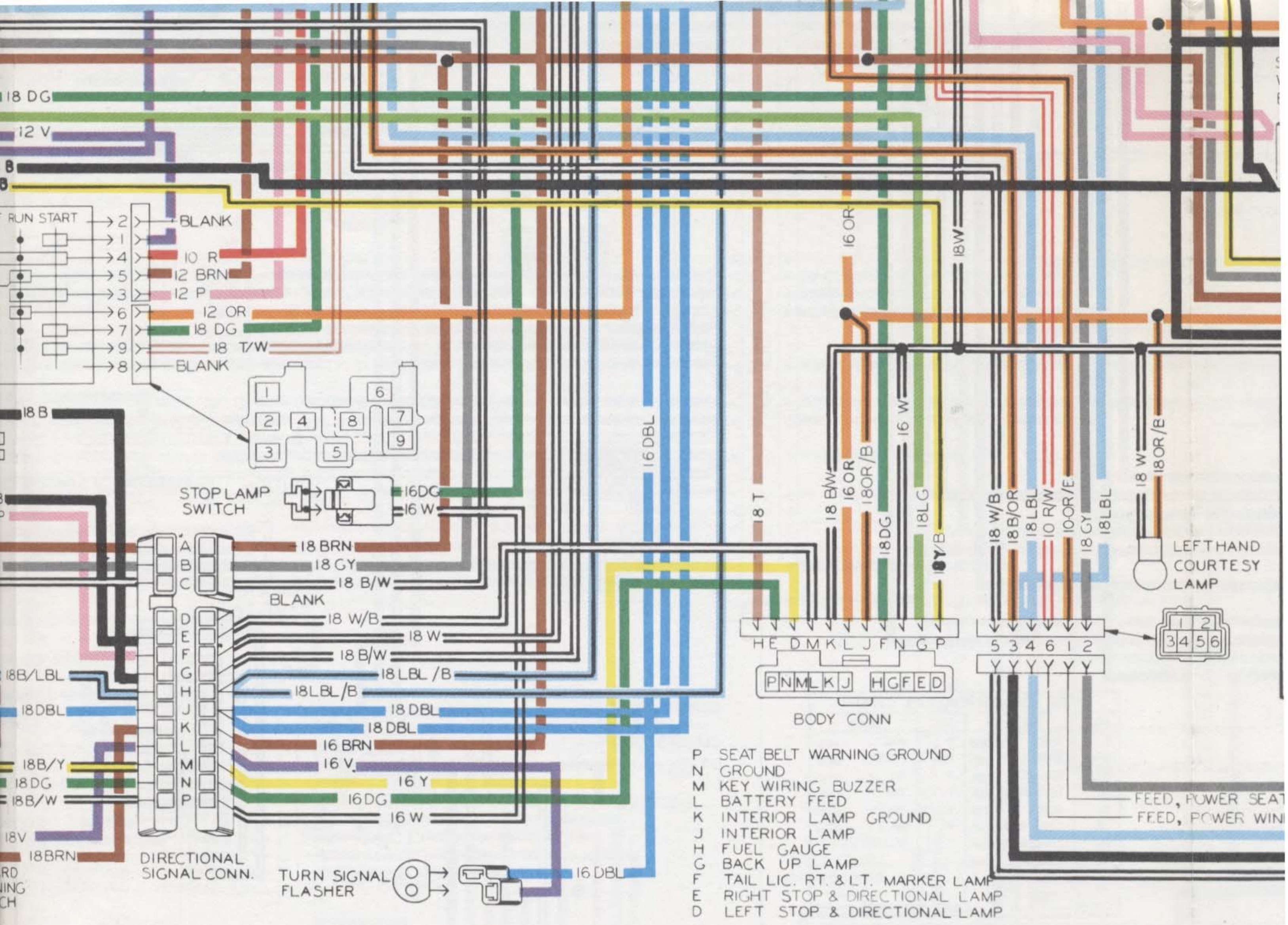
WIRE IDENTIFICATION CHART

WIRE GAUGE — 908 - 18 — CIRCUIT; WIRE COLOR — B / W — STRIPE COLOR WHEN USED

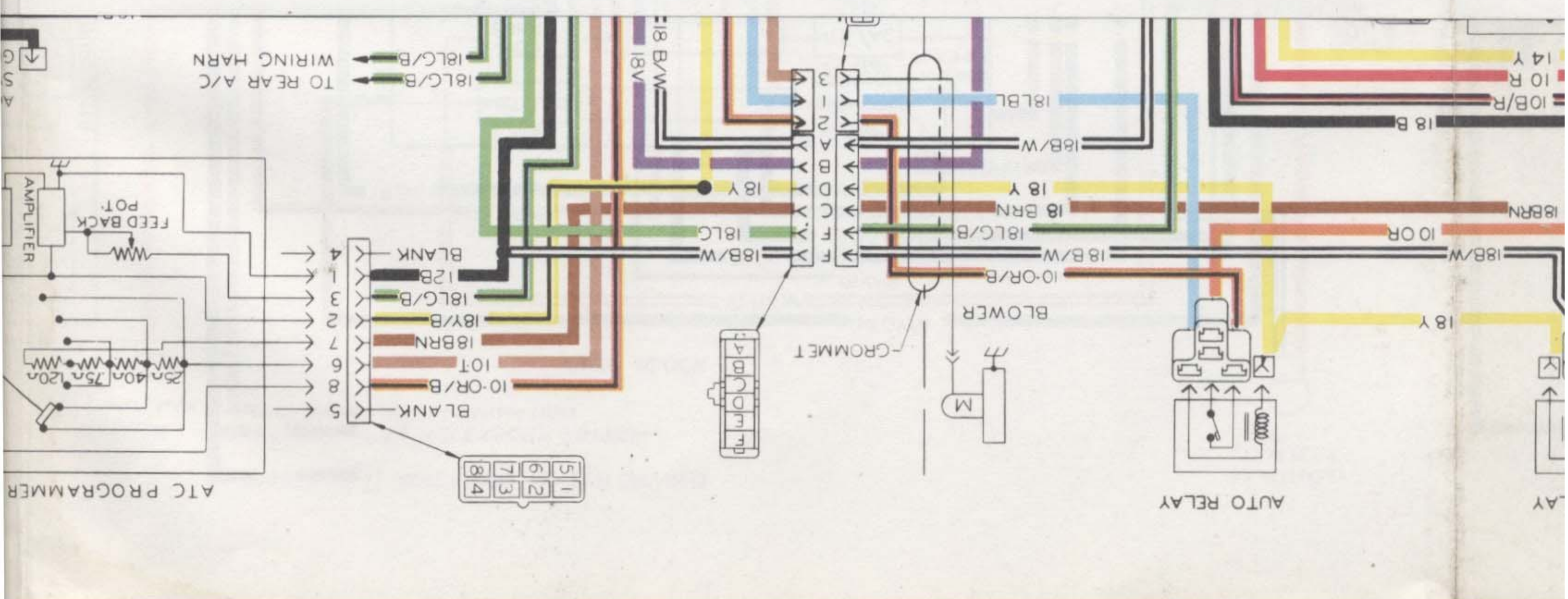
BROUGHAM, CALAIS, AND DE VILLE

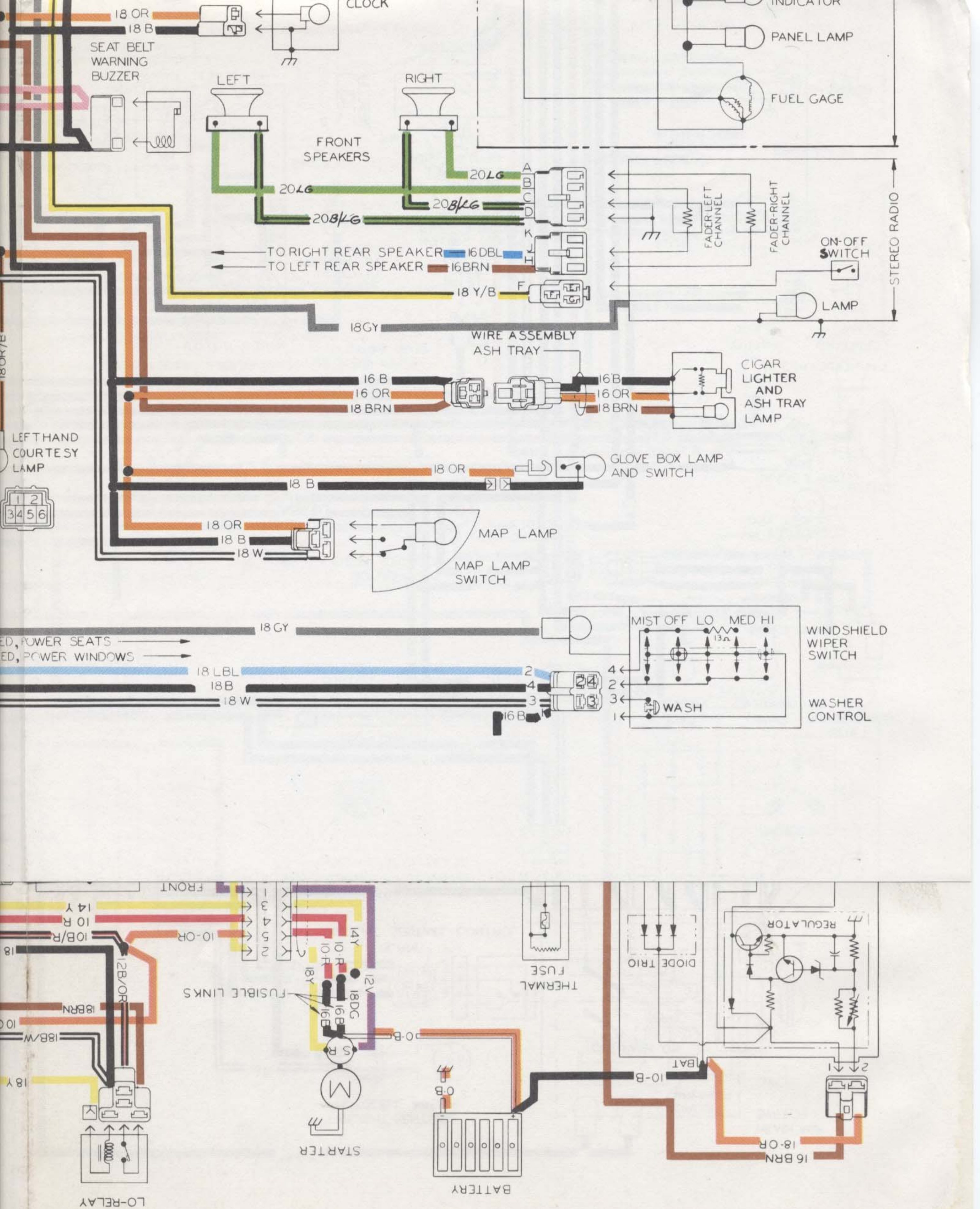


FRAME 2 of 3	1602325



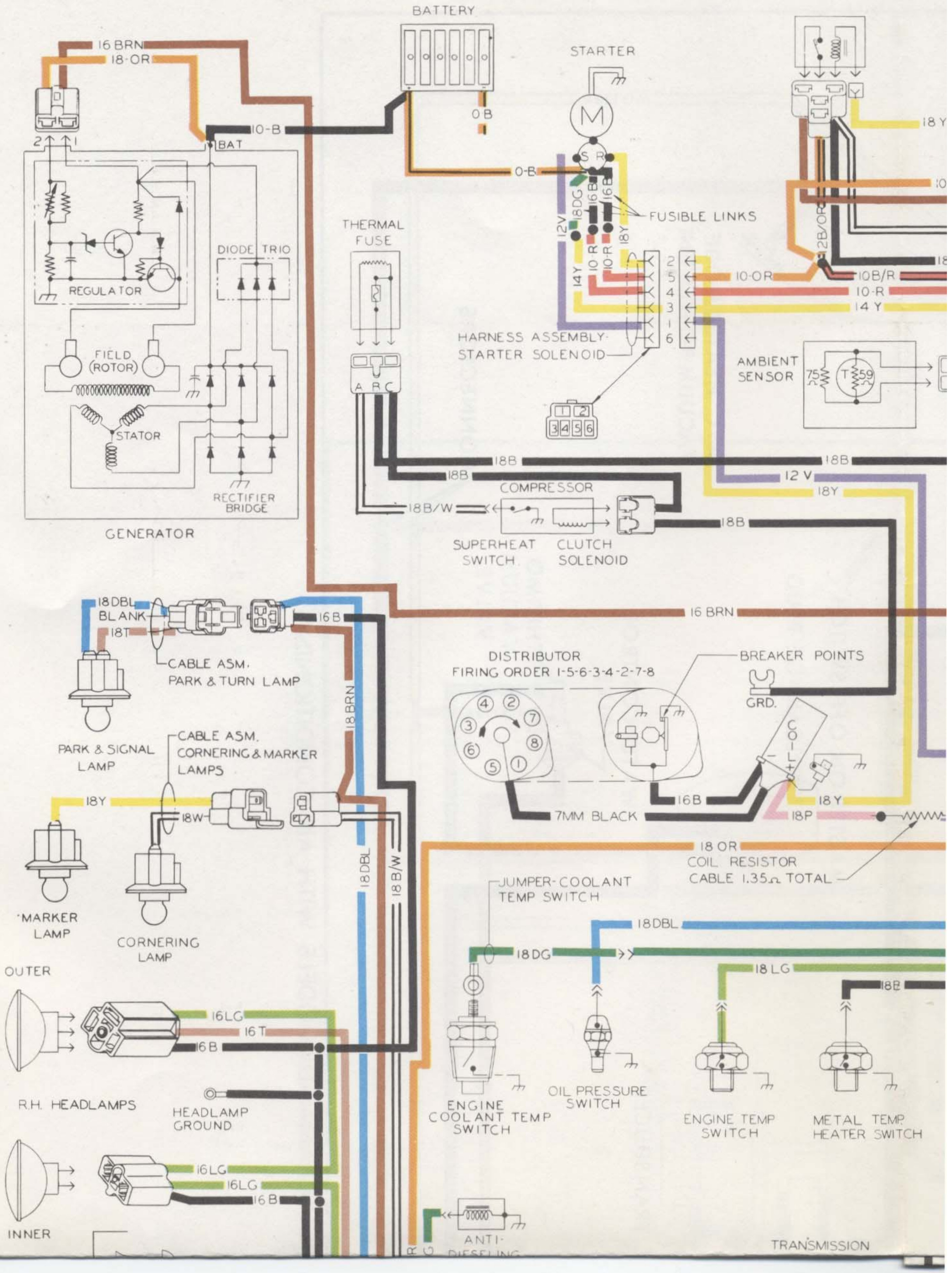
DE VILLE CHASSIS CIRCUIT DIAGRAM

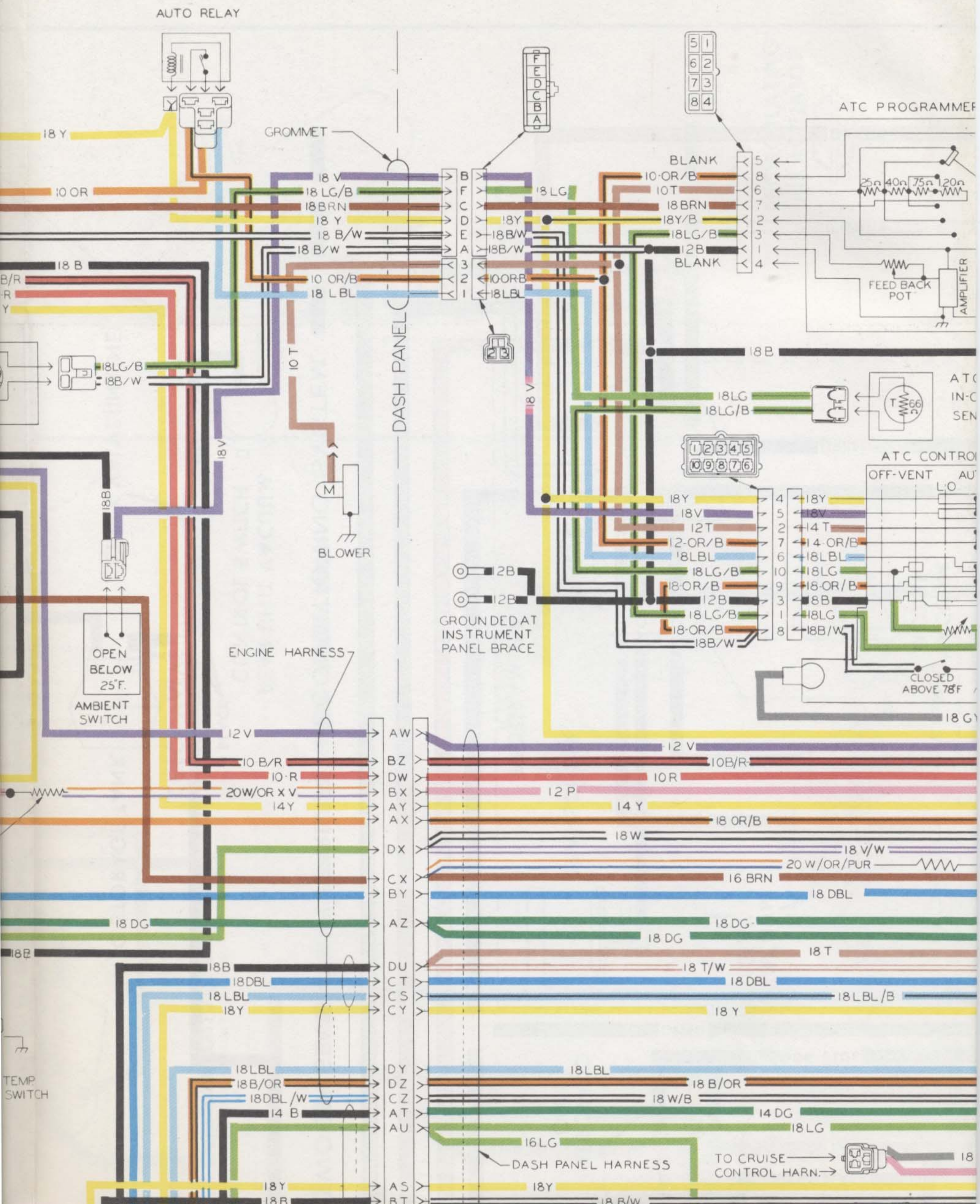




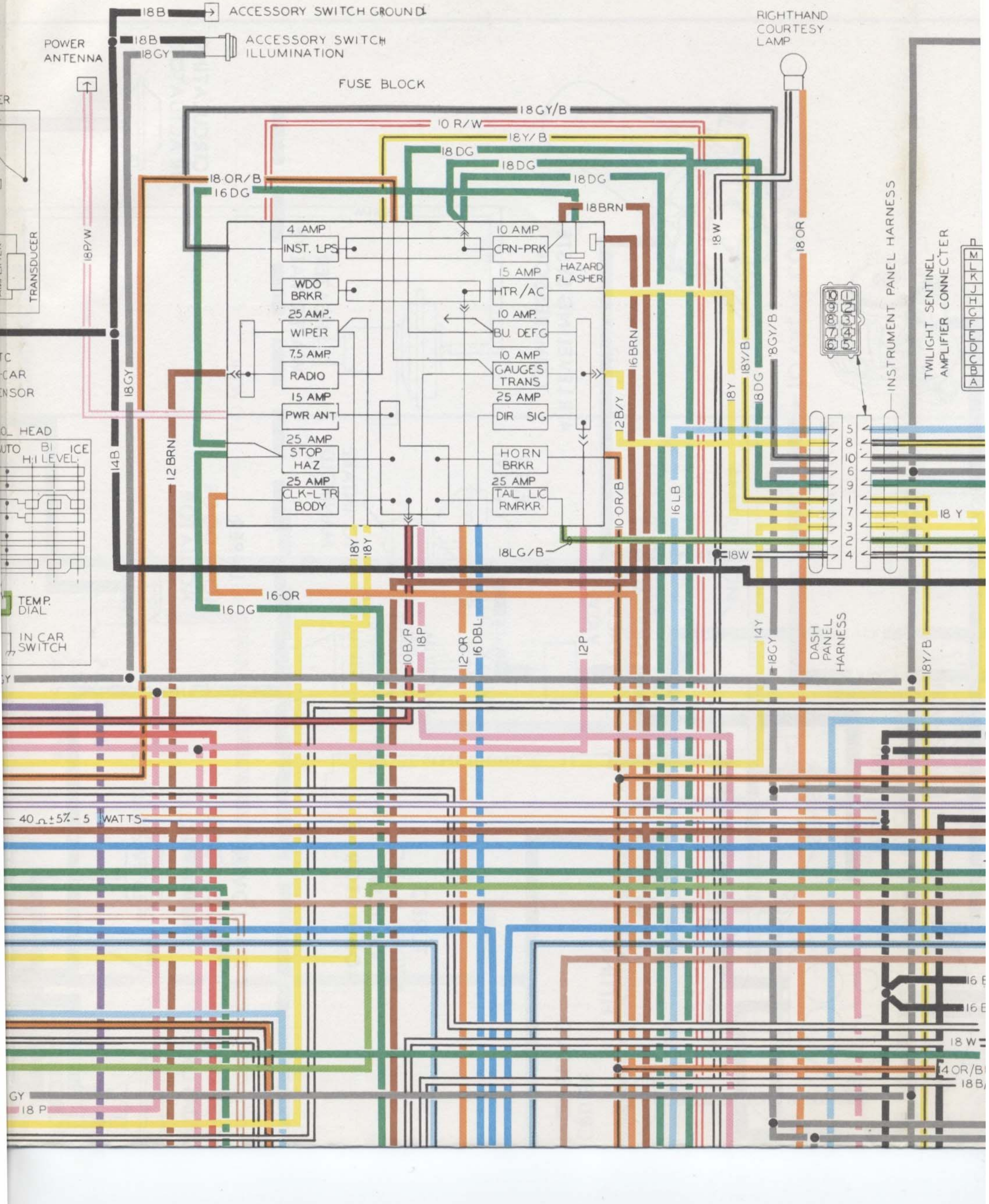
CLOCK
18 OR
18 B
SEAT BELT WARNING BUZZER
INDICATOR
PANEL LAMP
FUEL GAGE
LEFT
RIGHT
FRONT SPEAKERS
20LG
20B/LG
A
B
C
D
K
J
H
F
FADER LEFT CHANNEL
FADER-RIGHT CHANNEL
STEREO RADIO
ON-OFF SWITCH
TO RIGHT REAR SPEAKER
16DBL
TO LEFT REAR SPEAKER
16BRN
18 Y/B
LAMP
18GY
WIRE ASSEMBLY ASH TRAY
16 B
16 OR
18 BRN
CIGAR LIGHTER AND ASH TRAY LAMP
LEFT HAND COURTESY LAMP
1 2
3 4 5 6
18 OR
18 B
GLOVE BOX LAMP AND SWITCH
18 W
MAP LAMP
MAP LAMP SWITCH
18 GY
MIST OFF LO MED HI
13Ω
WINDSHIELD WIPER SWITCH
ED, POWER SEATS
ED, POWER WINDOWS
18 LBL
18B
18 W
16 B
WASH
WASHER CONTROL
FRONT
14 Y
10 R
10B/R
10-OR
12B/OR
14Y
10 R
10 R
18Y
12V
18DG
16B
16B
FUSIBLE LINKS
18BRN
18B/W
18 Y
O-B
S
R
M
STARTER
BATTERY
LO-RELAY
THERMAL FUSE
DIODE TRIO
REGULATOR
BAT
10-B
18-OR
16 BRN

BROUGHAM, CALAIS, AND DE VILLE CHASSIS CIRCUIT DIAGRAM

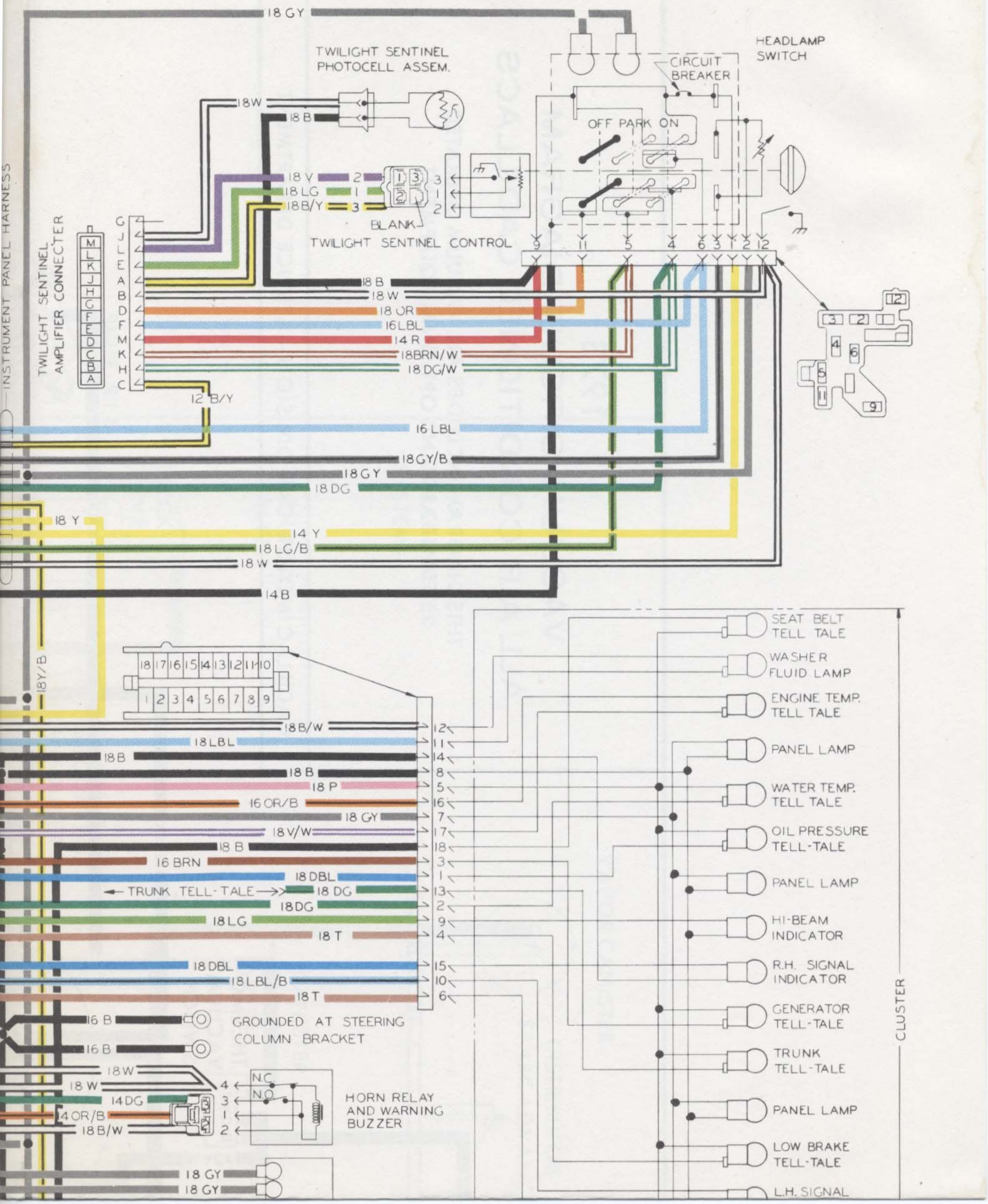

BATTERY
STARTER
16 BRN
18-OR
10-B
BAT
0B
0-B
FUSIBLE LINKS
18DG
16B
16B
12V
10-R
10-R
18Y
14Y
THERMAL FUSE
DIODE TRIO
REGULATOR
FIELD (ROTOR)
STATOR
RECTIFIER BRIDGE
GENERATOR
HARNESS ASSEMBLY-STARTER SOLENOID
10-OR
10B/R
10-R
14 Y
12B/OR
18 Y
AMBIENT SENSOR
18B
18B
12 V
18Y
COMPRESSOR
18B/W
SUPERHEAT SWITCH
CLUTCH SOLENOID
18B
16 BRN
18DBL
BLANK
18T
16B
CABLE ASM. PARK & TURN LAMP
PARK & SIGNAL LAMP
DISTRIBUTOR
FIRING ORDER 1-5-6-3-4-2-7-8
BREAKER POINTS
GRD.
COIL
18 BRN
CABLE ASM. CORNERING & MARKER LAMPS
18Y
18W
16B
18Y
18P
7MM BLACK
18 OR
COIL RESISTOR CABLE 1.35Ω TOTAL
18DBL
18B/W
MARKER LAMP
CORNERING LAMP
JUMPER-COOLANT TEMP SWITCH
18DBL
18DG
18LG
18B
OUTER
16LG
16T
16B
R.H. HEADLAMPS
HEADLAMP GROUND
ENGINE COOLANT TEMP SWITCH
OIL PRESSURE SWITCH
ENGINE TEMP SWITCH
METAL TEMP HEATER SWITCH
16LG
16LG
16B
INNER
ANTI-DIESELING
TRANSMISSION



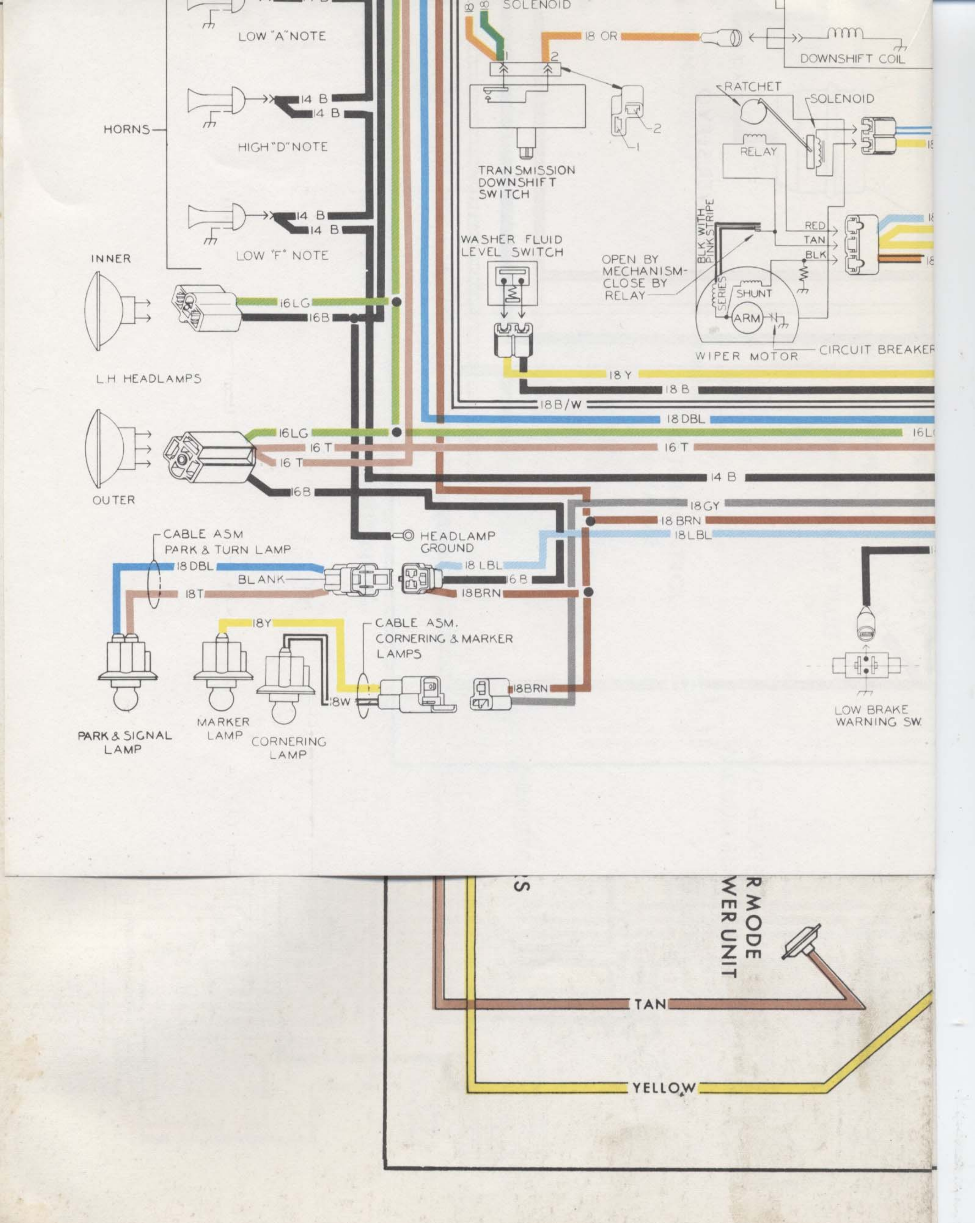
AUTO RELAY
GROMMET
DASH PANEL
BLOWER
ATC PROGRAMMER
BLANK
FEED BACK POT
AMPLIFIER
ATC IN-C SEN
ATC CONTRO
OFF-VENT
LO
GROUNDED AT INSTRUMENT PANEL BRACE
OPEN BELOW 25°F.
AMBIENT SWITCH
ENGINE HARNESS
CLOSED ABOVE 78°F
TEMP SWITCH
DASH PANEL HARNESS
TO CRUISE CONTROL HARN.
18 Y
10 OR
18 B
18 V
18 LG/B
18 BRN
18 B/W
10 OR/B
18 LBL
10 T
10-OR/B
10 T
18Y/B
18LG/B
12B
18LG
18B/W
10ORB
18 V
18LG
18LG/B
18Y
18V
12T
12-OR/B
18LBL
18OR/B
12B
18LG/B
18-OR/B
18B/W
14 T
14 OR/B
18B
18 GY
12 V
10 B/R
10-R
20W/OR X V
14Y
18 DG
18B
18DBL
18 LBL
18LBL
18B/OR
18DBL/W
14 B
12 P
14 Y
18 OR/B
18 W
18 V/W
20 W/OR/PUR
16 BRN
18 DBL
18 T
18 T/W
18 LBL/B
18 B/OR
18 W/B
14 DG
16 LG
18 B/W
AW
BZ
DW
BX
AY
AX
DX
CX
BY
AZ
DU
CT
CS
CY
DY
DZ
CZ
AT
AU
AS
BT

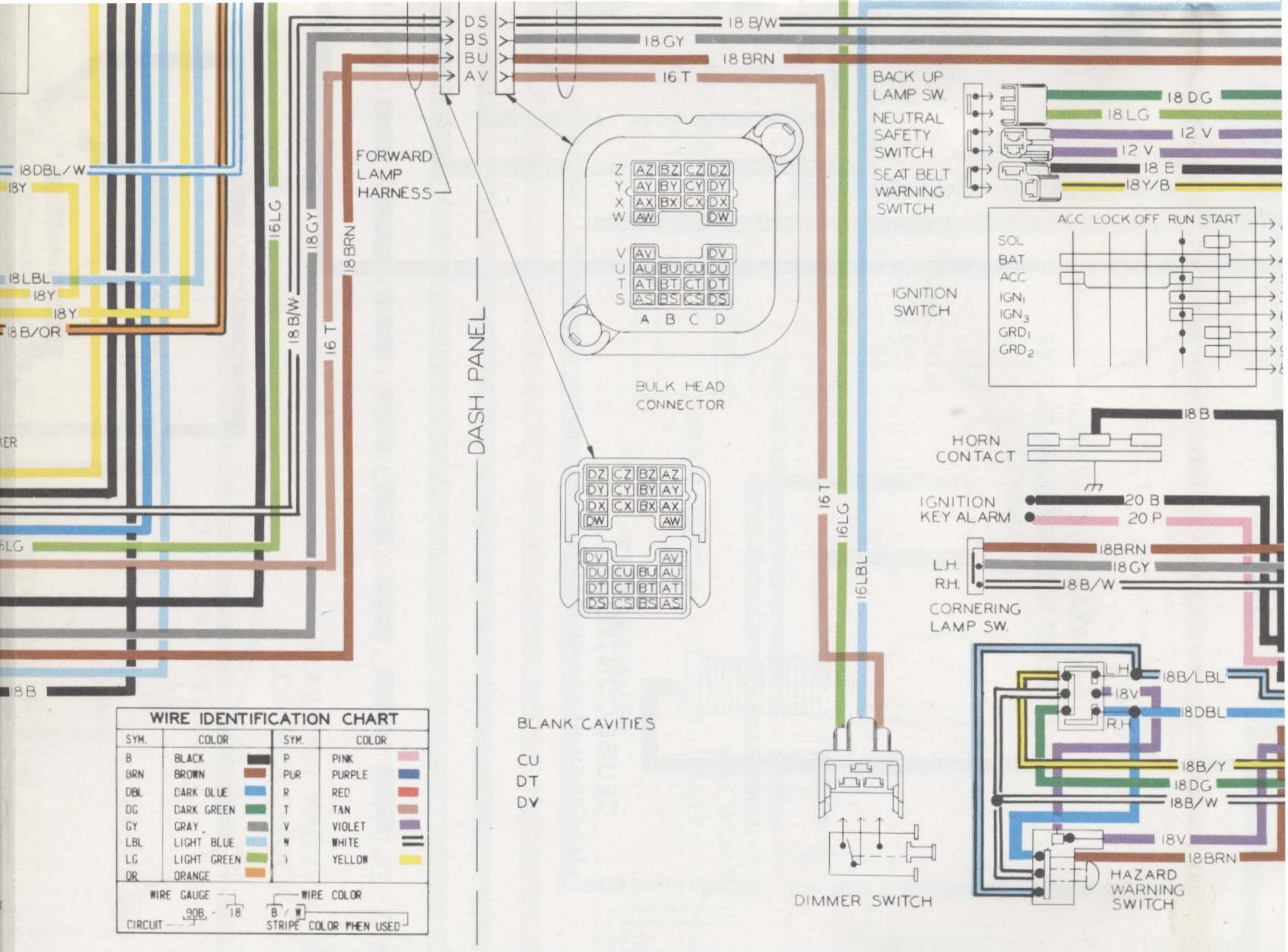


18 B
ACCESSORY SWITCH GROUND
POWER ANTENNA
18 B
18 GY
ACCESSORY SWITCH ILLUMINATION
FUSE BLOCK
RIGHTHAND COURTESY LAMP
18 GY/B
10 R/W
18 Y/B
18 DG
18 DG
18 DG
18 OR/B
16 DG
18 BRN
4 AMP
INST. LPS
10 AMP
CRN-PRK
HAZARD FLASHER
WDO BRKR
15 AMP
HTR/AC
25 AMP.
WIPER
10 AMP.
BU. DEFG
7.5 AMP
RADIO
10 AMP
GAUGES TRANS
15 AMP
PWR ANT
25 AMP
DIR SIG
25 AMP
STOP HAZ
HORN BRKR
25 AMP
CLK-LTR BODY
25 AMP
TAIL LIC RMRKR
TRANSDUCER
18 P/W
18 GY
14 B
12 BRN
16 BRN
12 B/Y
10 OR/B
18 W
18 OR
18 Y
18 Y/B
18 DG
18 GY/B
16 LB
INSTRUMENT PANEL HARNESS
TWILIGHT SENTINEL AMPLIFIER CONNECTER
M L K J H G F E D C B A
5 8 10 6 9 1 7 3 2 4
18 Y
18 LG/B
18 W
18 Y
18 Y
16 OR
16 DG
10 B/R
18 P
12 OR
16 DBL
12 P
14 Y
18 GY
DASH PANEL HARNESS
18 Y/B
TEMP. DIAL
IN CAR SWITCH
HEAD
AUTO BI ICE
HI LEVEL
40 Ω ±5% - 5 WATTS
16 B
16 B
18 W
14 OR/B
18 B
GY
18 P



INSTRUMENT PANEL HARNESS
TWILIGHT SENTINEL PHOTOCELL ASSEM.
HEADLAMP SWITCH
CIRCUIT BREAKER
OFF PARK ON
BLANK
TWILIGHT SENTINEL CONTROL
TWILIGHT SENTINEL AMPLIFIER CONNECTER
18 GY
18 W
18 B
18 V
18 LG
18 B/Y
18 OR
16 LBL
14 R
18 BRN/W
18 DG/W
12 B/Y
16 LBL
18 GY/B
18 GY
18 DG
18 Y
14 Y
18 LG/B
18 W
14 B
18Y/B
18 B/W
18 LBL
18 B
18 B
18 P
16 OR/B
18 GY
18 V/W
18 B
16 BRN
18 DBL
TRUNK TELL-TALE
18 DG
18 DG
18 LG
18 T
18 DBL
18 LBL/B
18 T
16 B
16 B
GROUNDED AT STEERING COLUMN BRACKET
18 W
18 W
14 DG
14 OR/B
18 B/W
N.C.
N.O.
HORN RELAY AND WARNING BUZZER
18 GY
18 GY
SEAT BELT TELL TALE
WASHER FLUID LAMP
ENGINE TEMP. TELL TALE
PANEL LAMP
WATER TEMP. TELL TALE
OIL PRESSURE TELL-TALE
PANEL LAMP
HI-BEAM INDICATOR
R.H. SIGNAL INDICATOR
GENERATOR TELL-TALE
TRUNK TELL-TALE
PANEL LAMP
LOW BRAKE TELL-TALE
L.H. SIGNAL
CLUSTER


SOLENOID
LOW "A" NOTE
HORNS
HIGH "D" NOTE
LOW "F" NOTE
14 B
18 OR
DOWNSHIFT COIL
TRANSMISSION DOWNSHIFT SWITCH
RATCHET
SOLENOID
RELAY
WASHER FLUID LEVEL SWITCH
BLK WITH PINKSTRIPE
OPEN BY MECHANISM- CLOSE BY RELAY
RED
TAN
BLK
SERIES
SHUNT
ARM
WIPER MOTOR
CIRCUIT BREAKER
INNER
L.H. HEADLAMPS
OUTER
16 LG
16 B
16 T
18 Y
18 B
18 B/W
18 DBL
14 B
18 GY
18 BRN
18 LBL
HEADLAMP GROUND
CABLE ASM PARK & TURN LAMP
BLANK
18 T
18 W
CABLE ASM. CORNERING & MARKER LAMPS
PARK & SIGNAL LAMP
MARKER LAMP
CORNERING LAMP
LOW BRAKE WARNING SW.
R MODE
WER UNIT
TAN
YELLOW

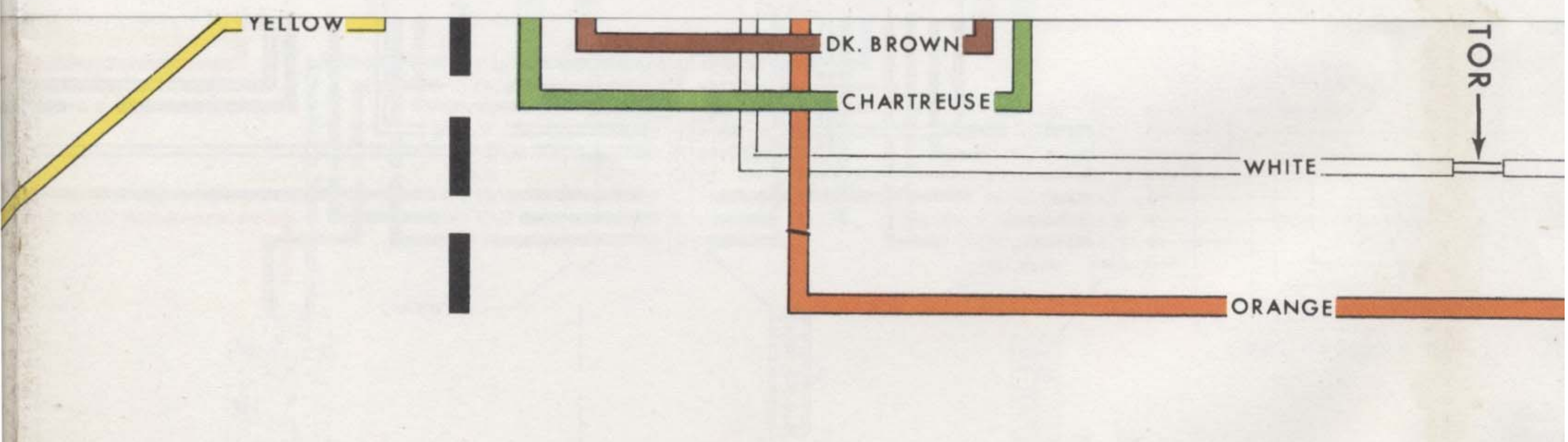


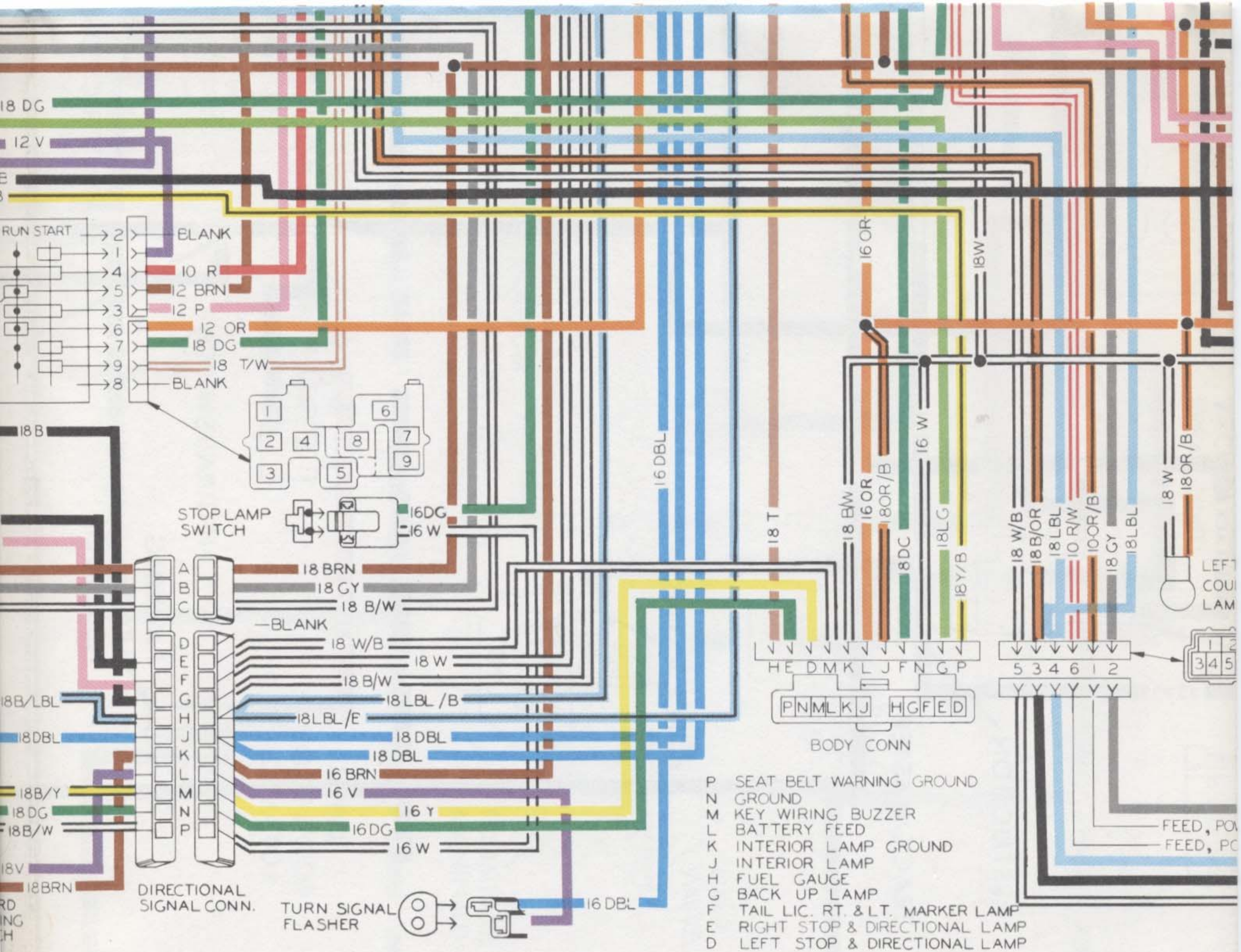
WIRE IDENTIFICATION CHART

SYM.	COLOR	SYM.	COLOR
B	BLACK	P	PINK
BRN	BROWN	PUR	PURPLE
DBL	DARK BLUE	R	RED
DG	DARK GREEN	T	TAN
GY	GRAY	V	VIOLET
LBL	LIGHT BLUE	W	WHITE
LG	LIGHT GREEN	Y	YELLOW
OR	ORANGE		

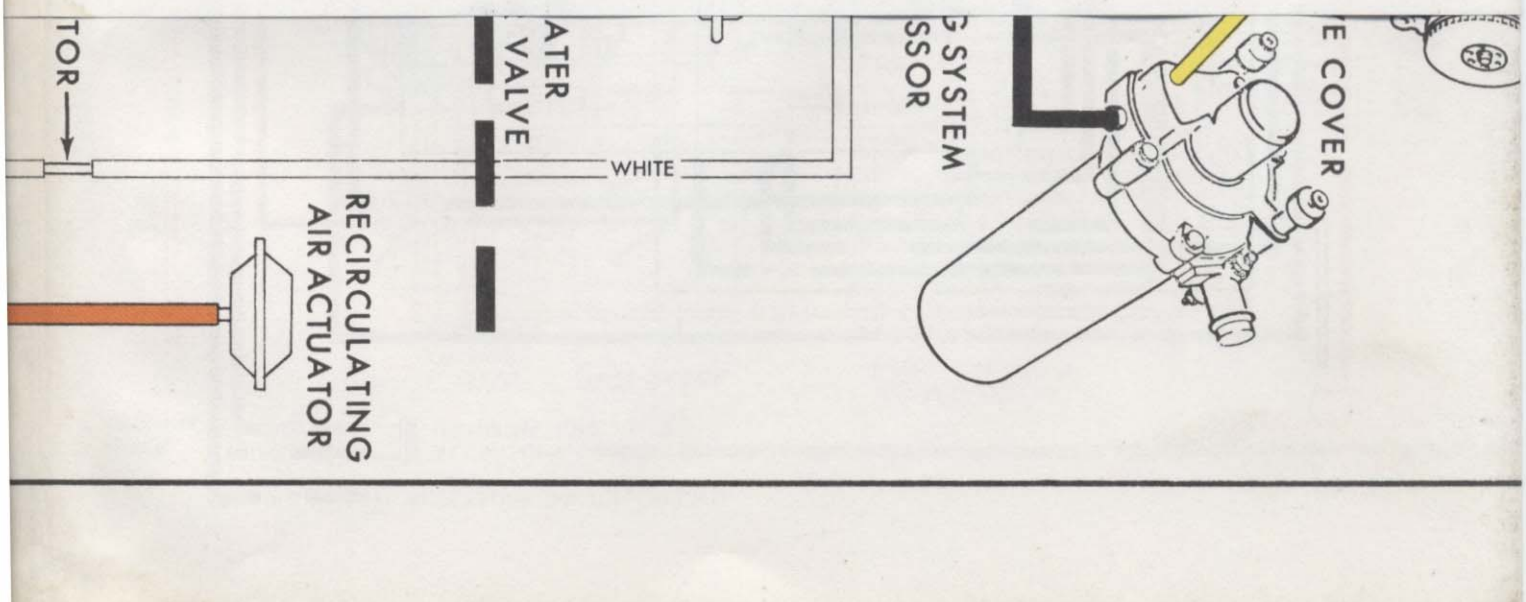
WIRE GAUGE — CIRCUIT 90B 18 — WIRE COLOR B / W — STRIPE COLOR WHEN USED

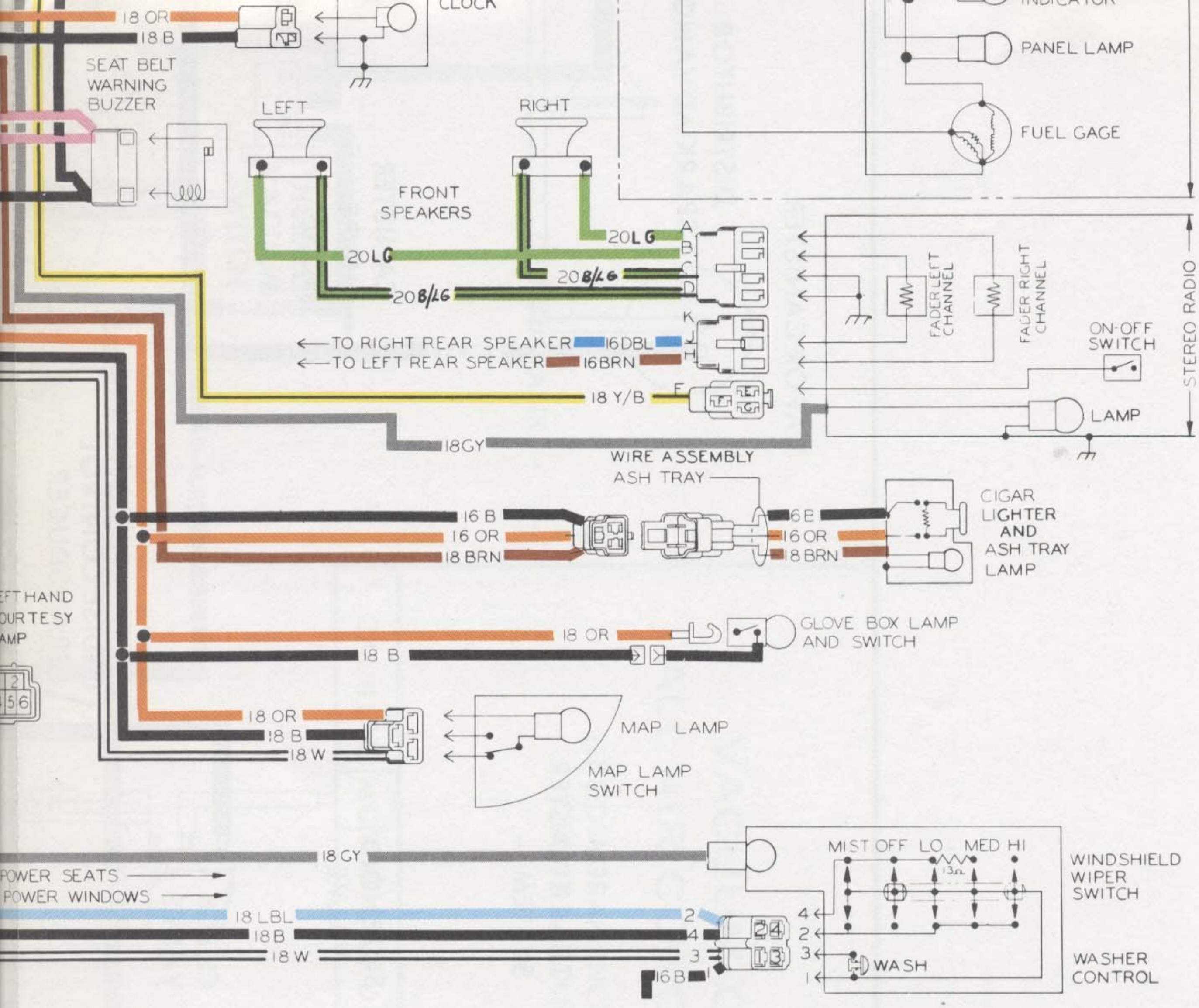
ELDORADO CHASSIS CIRCU





IS CIRCUIT DIAGRAM





DIAGRAM

D CADILLACS

ACUUM OPERATED EQUIPMENT

RVICE DEPARTMENT

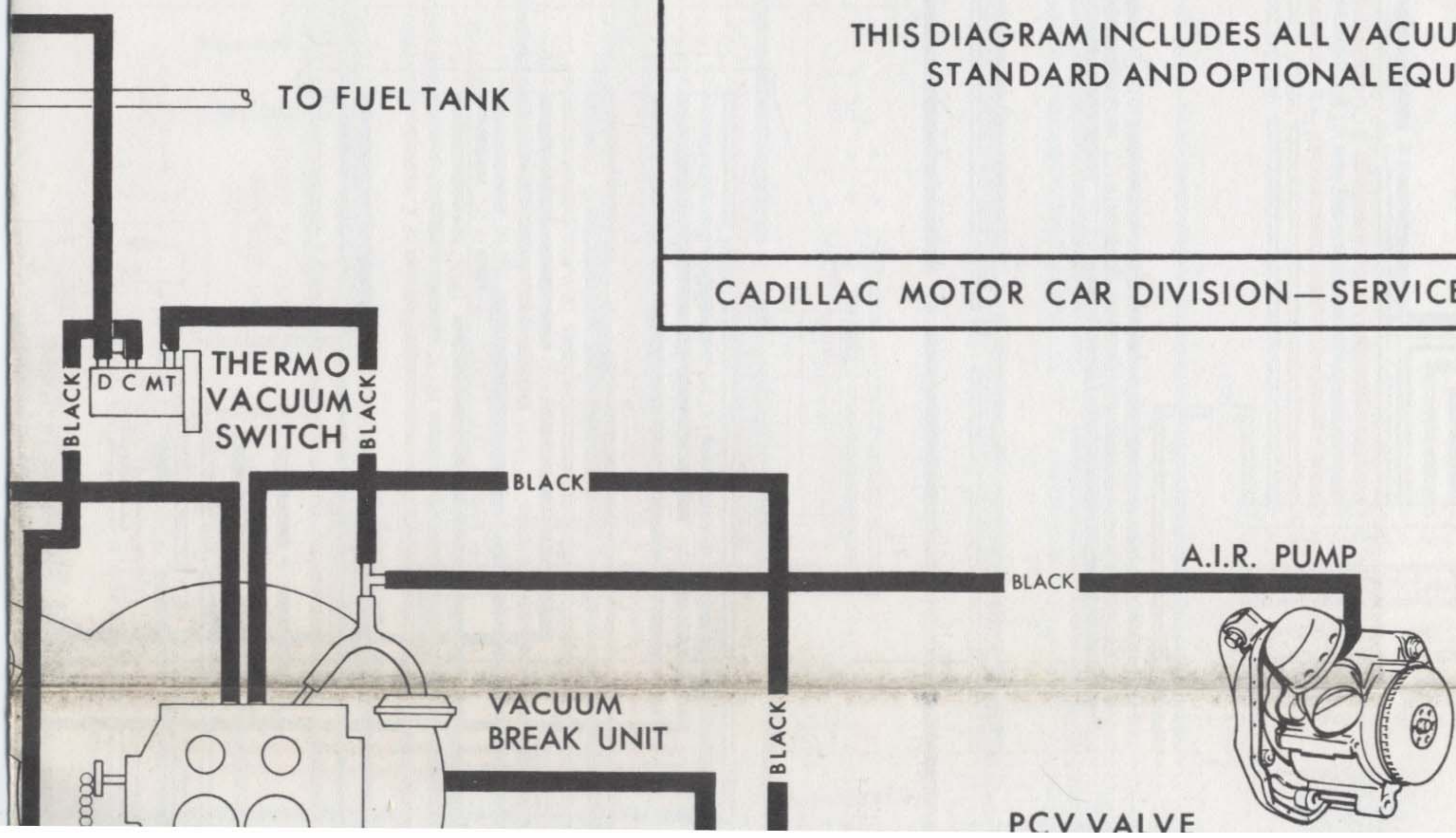
ELDORADO CHASSIS CIRCUIT DIAGRAM

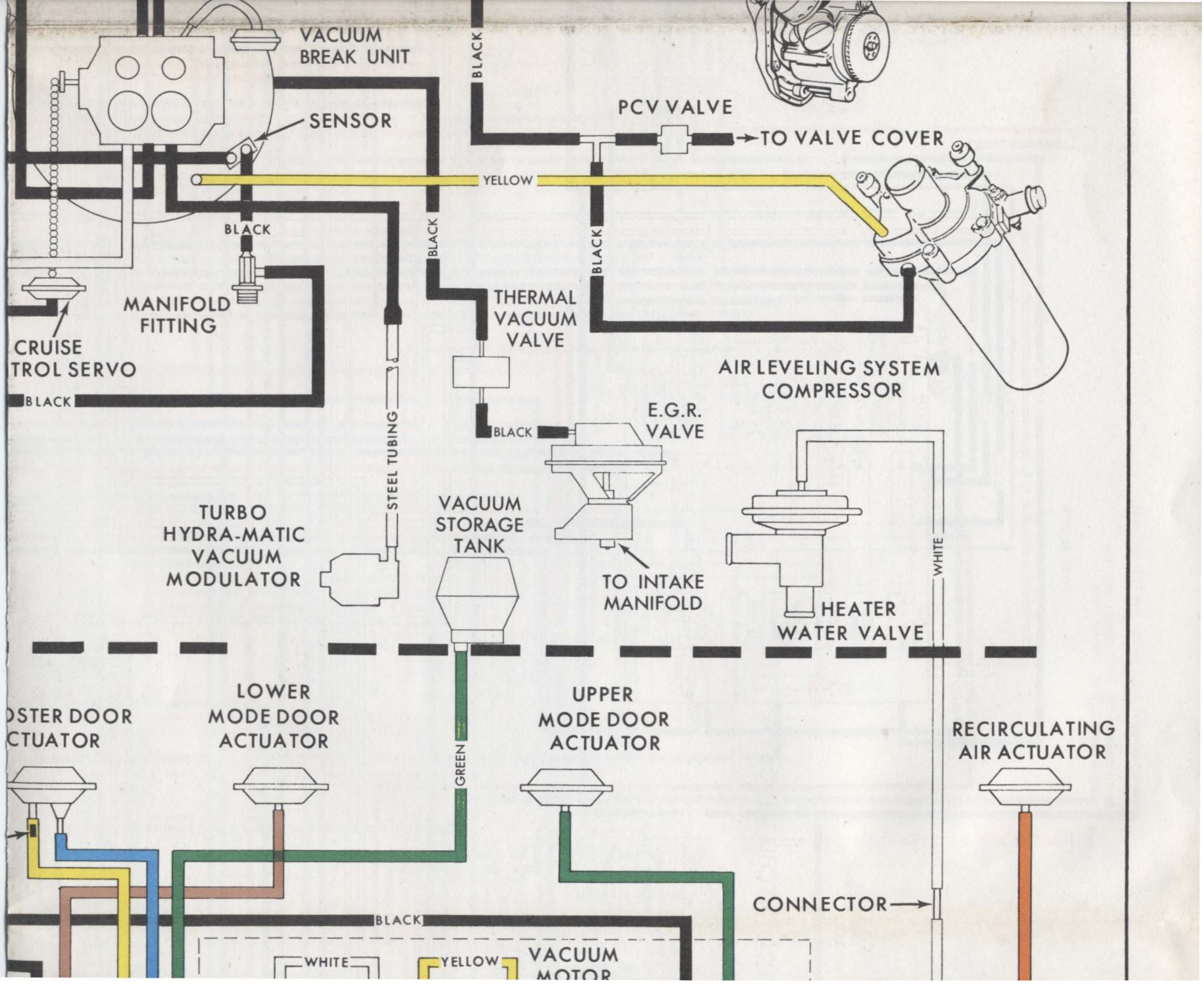
1973

VACUUM CIRCUIT DIAGRAM
ALL AIR CONDITIONED CADILLACS

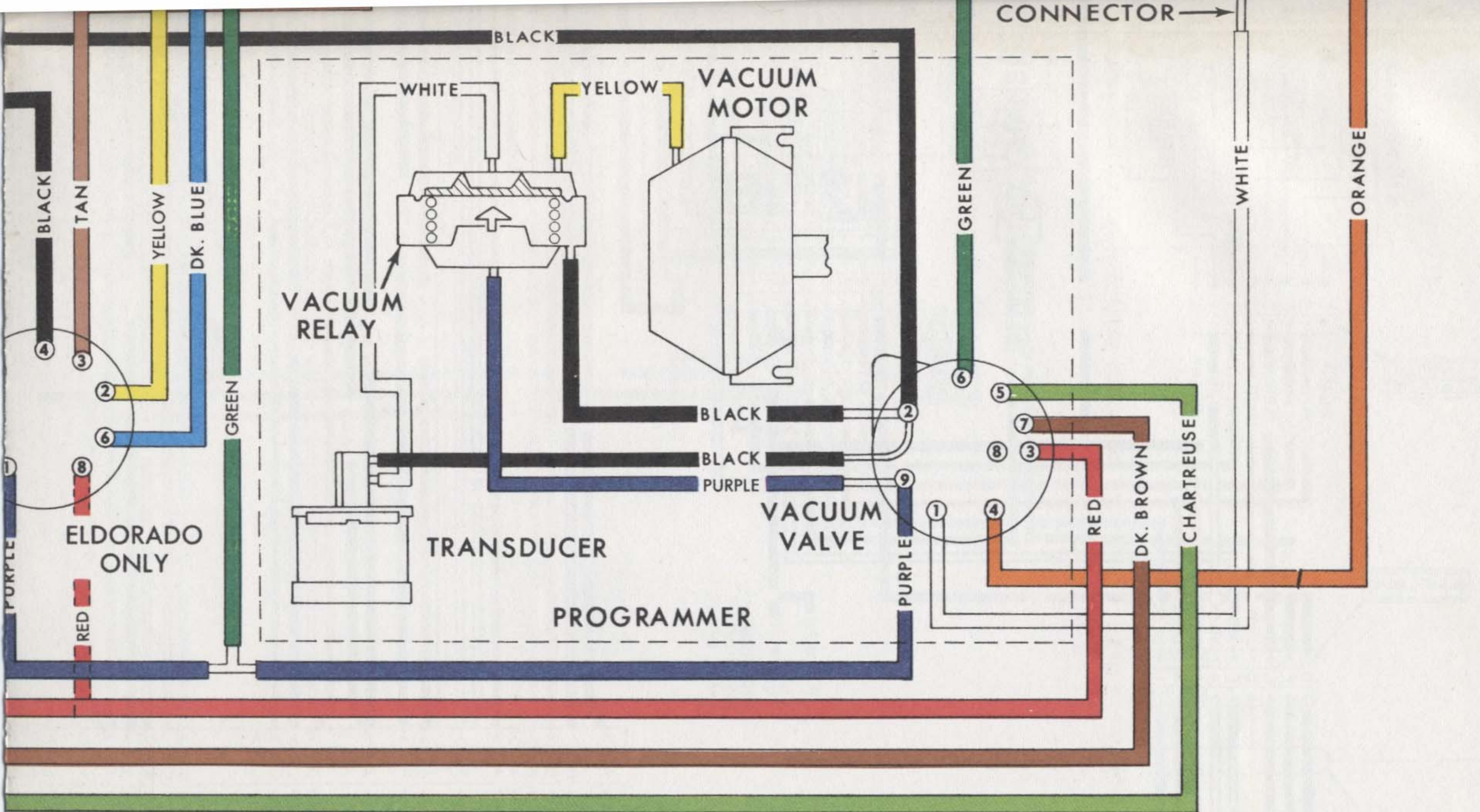
THIS DIAGRAM INCLUDES ALL VACUUM OPERATED
STANDARD AND OPTIONAL EQUIPMENT

CADILLAC MOTOR CAR DIVISION—SERVICE DEPARTMENT

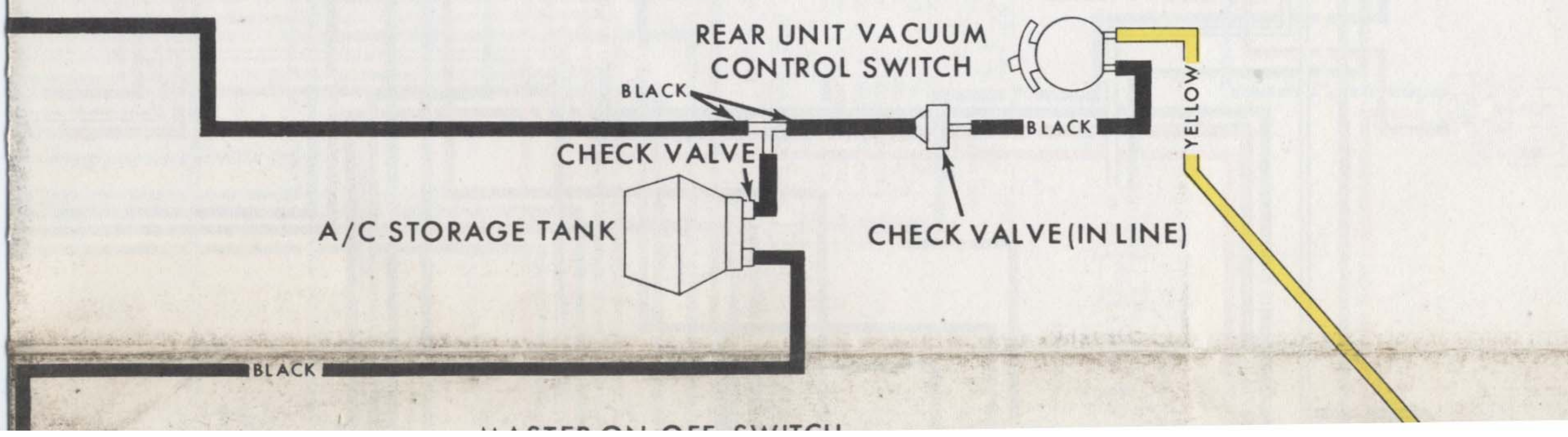


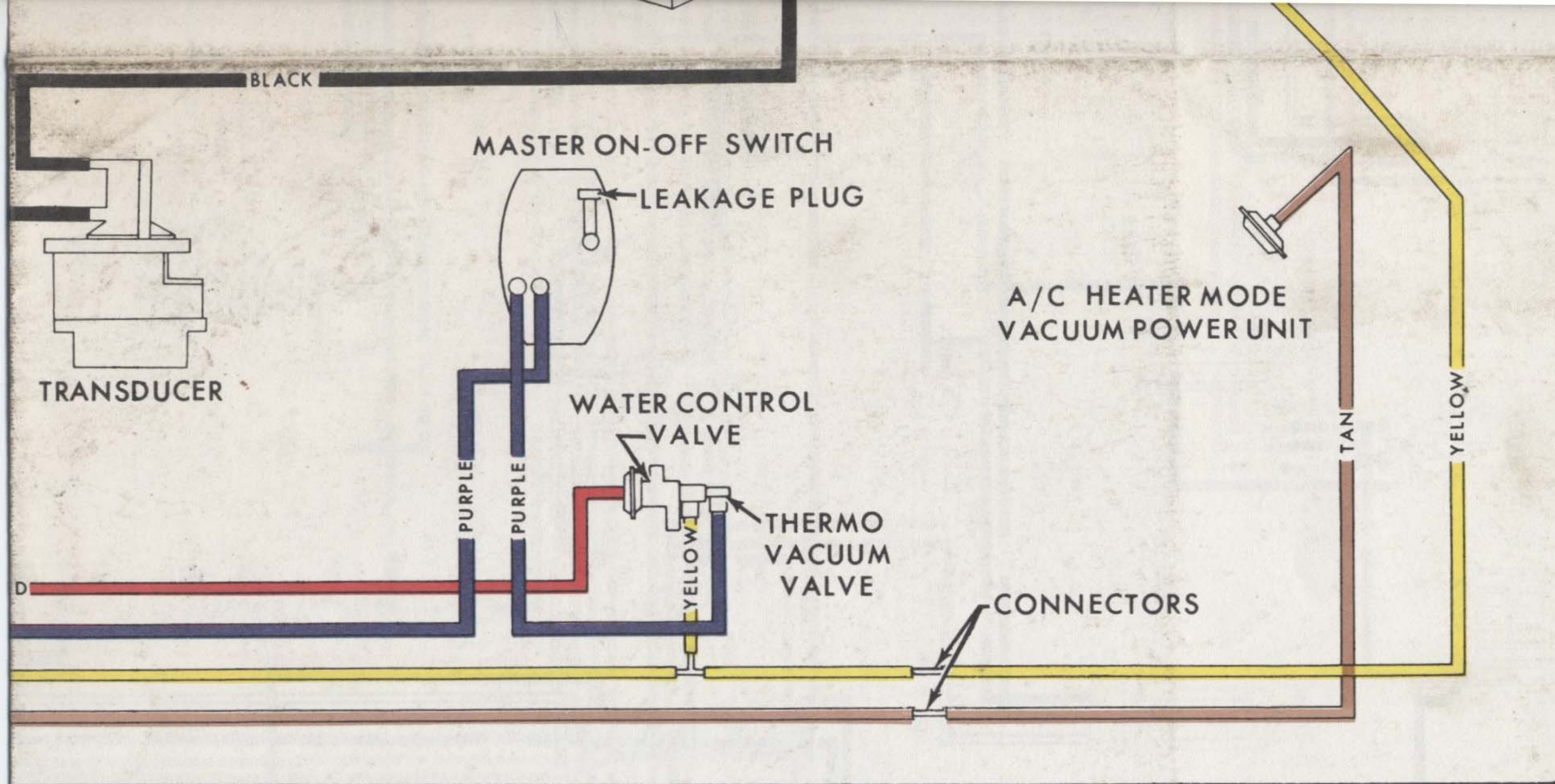


VACUUM BREAK UNIT
SENSOR
BLACK
PCV VALVE
TO VALVE COVER
YELLOW
MANIFOLD FITTING
CRUISE
TROL SERVO
THERMAL VACUUM VALVE
AIR LEVELING SYSTEM COMPRESSOR
E.G.R. VALVE
STEEL TUBING
TURBO HYDRA-MATIC VACUUM MODULATOR
VACUUM STORAGE TANK
TO INTAKE MANIFOLD
HEATER WATER VALVE
WHITE
LOWER MODE DOOR ACTUATOR
OSTER DOOR
CTUATOR
UPPER MODE DOOR ACTUATOR
RECIRCULATING AIR ACTUATOR
GREEN
CONNECTOR
VACUUM
MOTOR

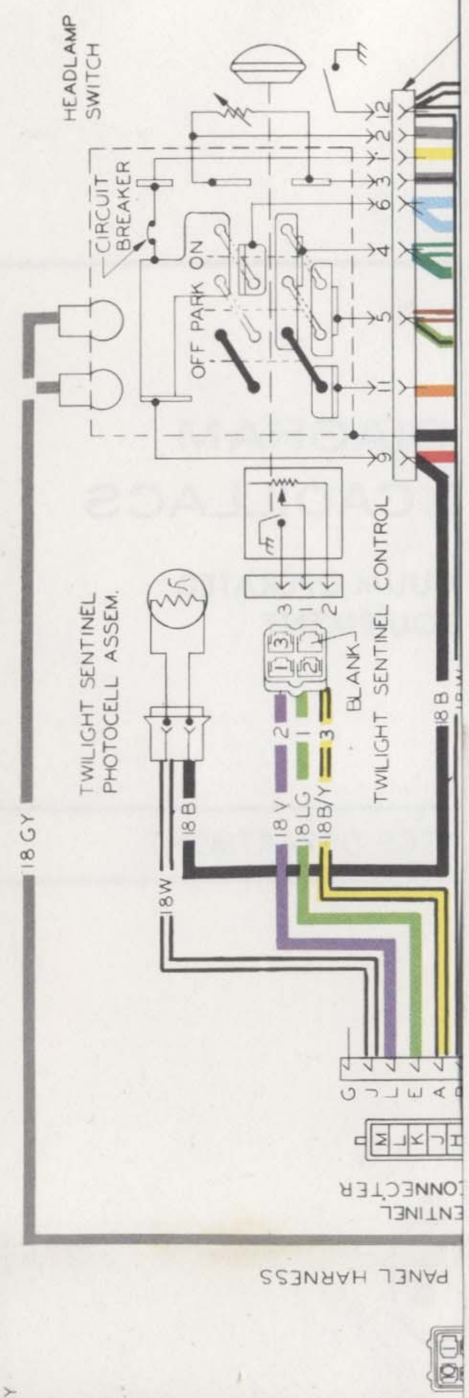


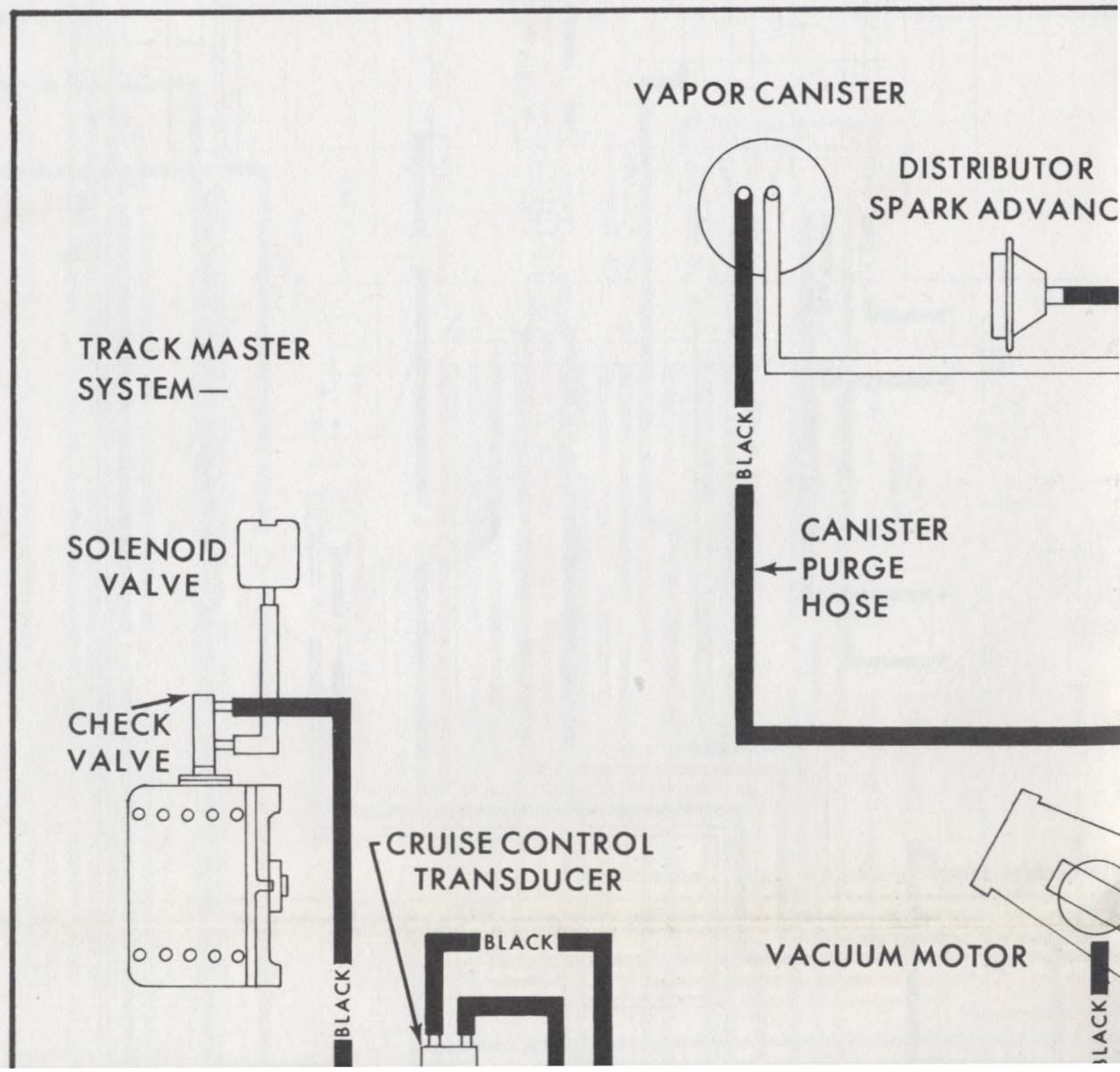
ETWOOD SEVENTY-FIVE REAR AIR CONDITIONING SYSTEM

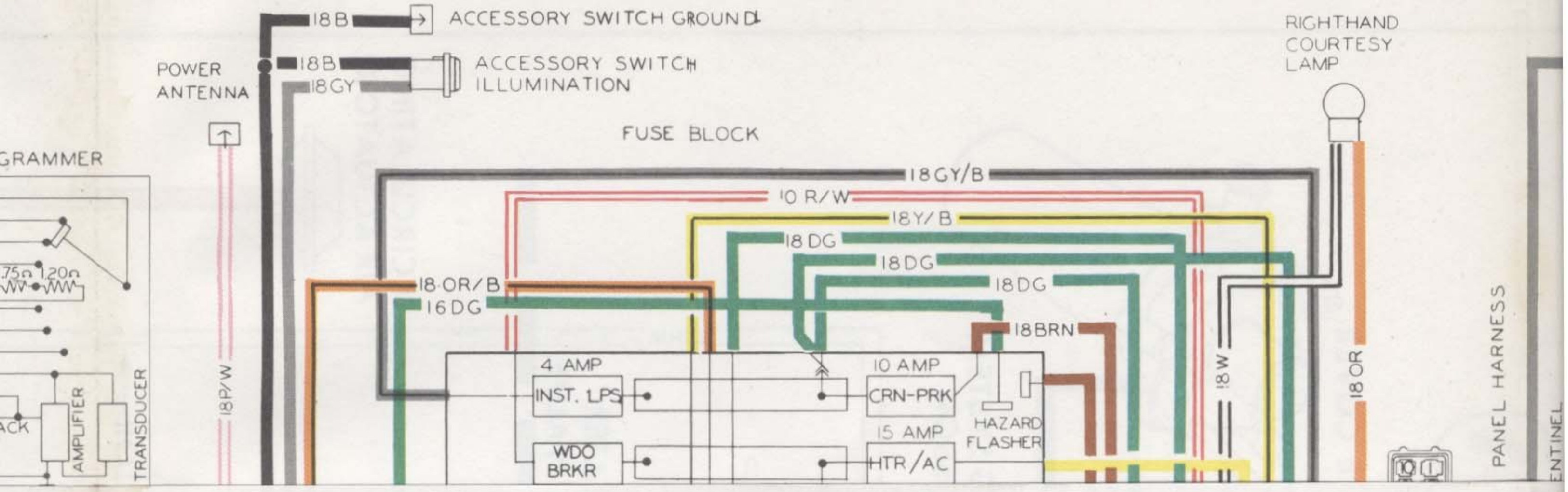


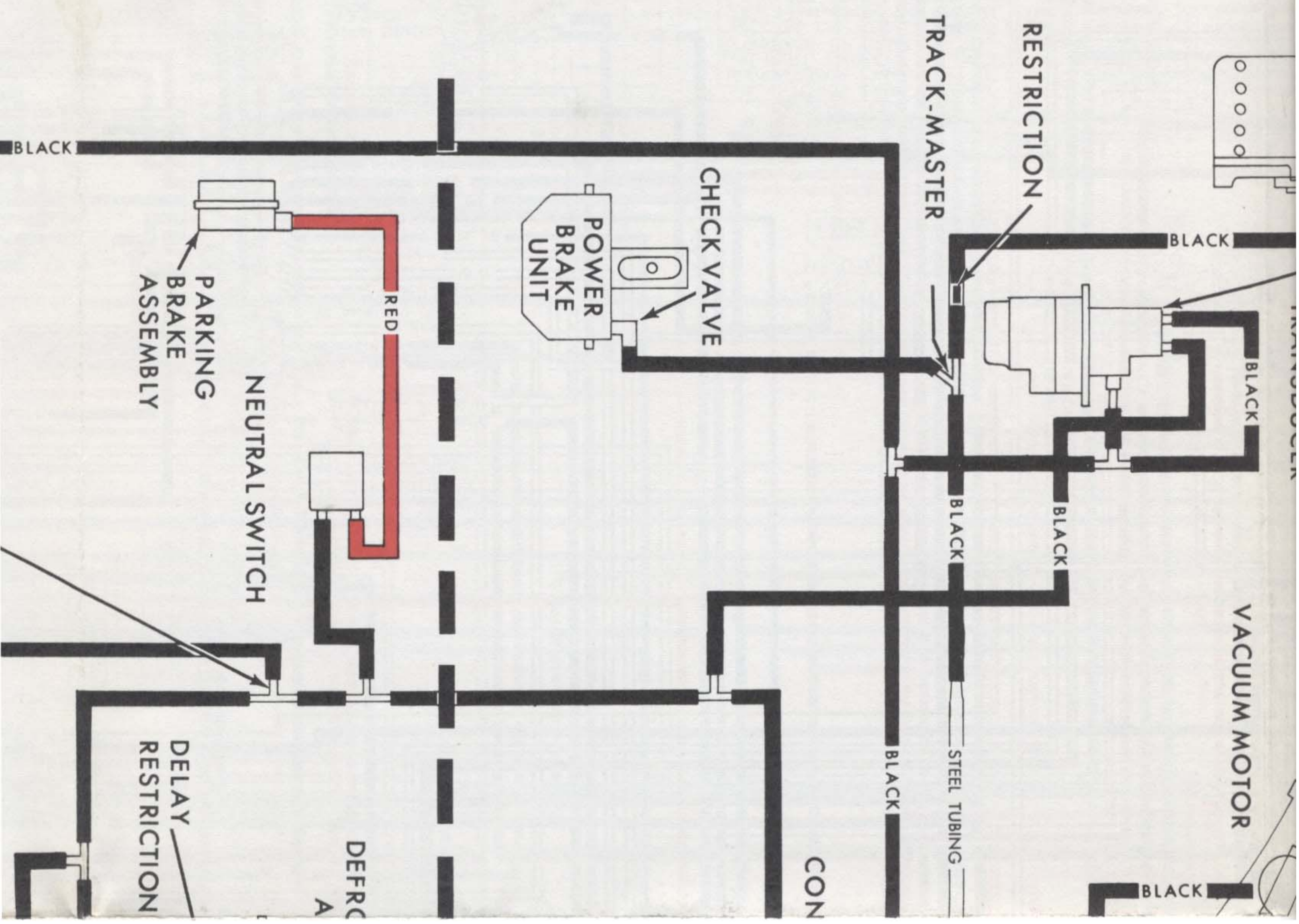


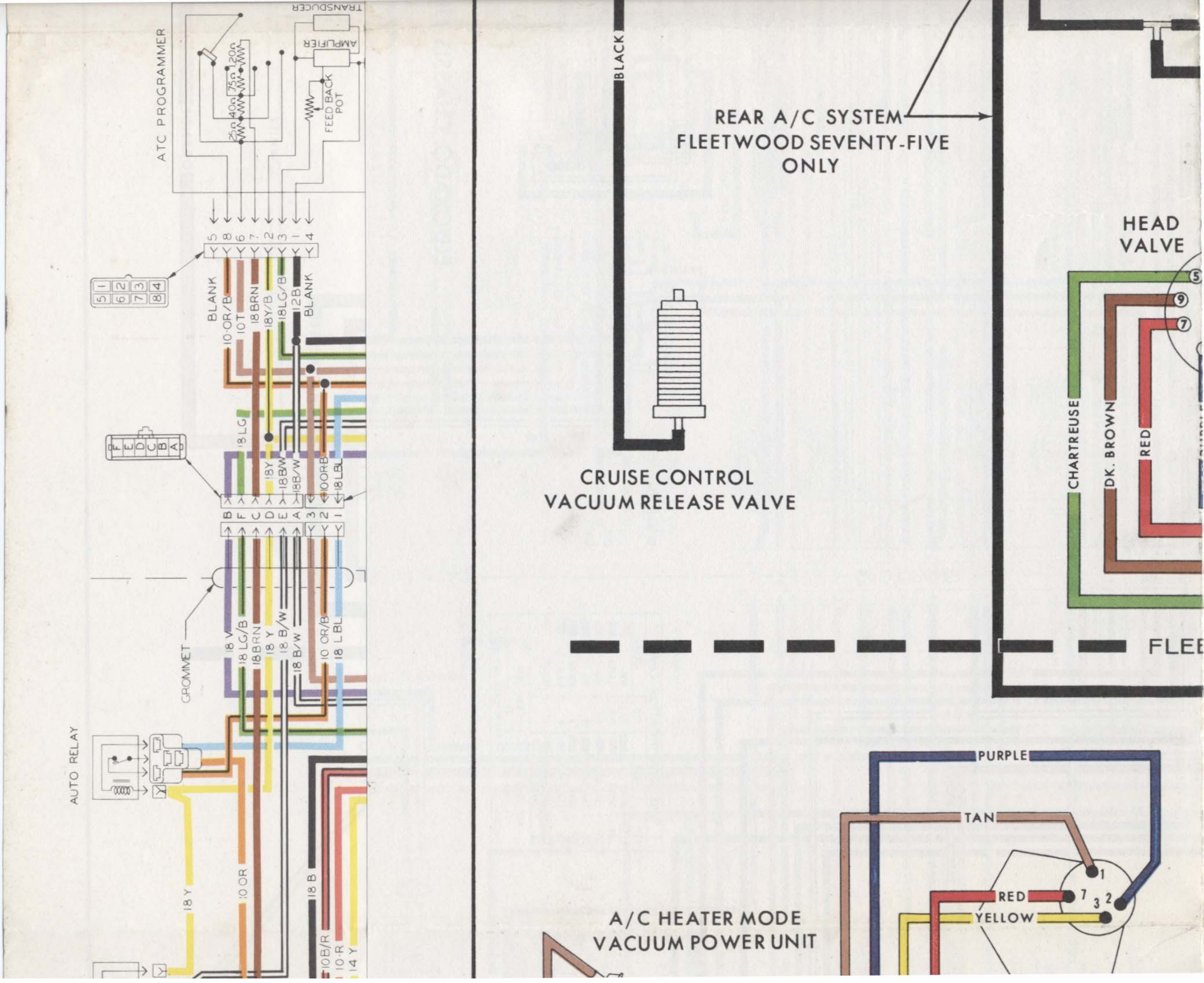
DIAGRAM—ALL MODELS WITH AIR CONDITIONING


HEADLAMP SWITCH
CIRCUIT BREAKER
OFF PARK ON
TWILIGHT SENTINEL PHOTOCELL ASSEM.
TWILIGHT SENTINEL CONTROL
BLANK
18 GY
18W
18 B
18 V
18 LG
18B/Y
SENTINEL CONNECTER
PANEL HARNESS

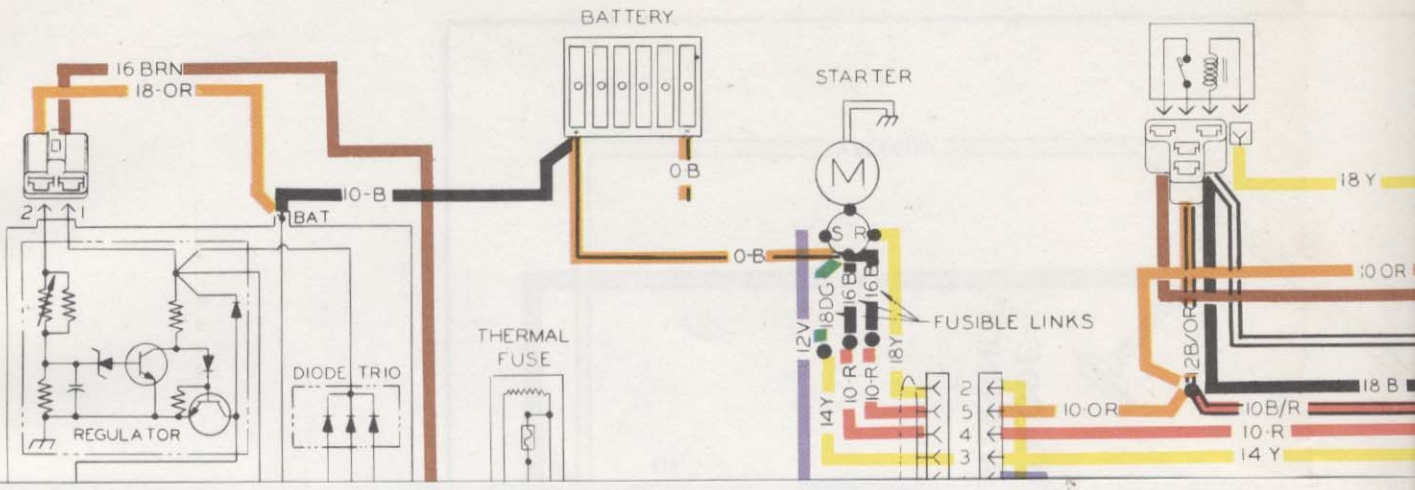

TRACK MASTER SYSTEM—
VAPOR CANISTER
DISTRIBUTOR SPARK ADVANC
BLACK
CANISTER PURGE HOSE
SOLENOID VALVE
CHECK VALVE
CRUISE CONTROL TRANSDUCER
VACUUM MOTOR

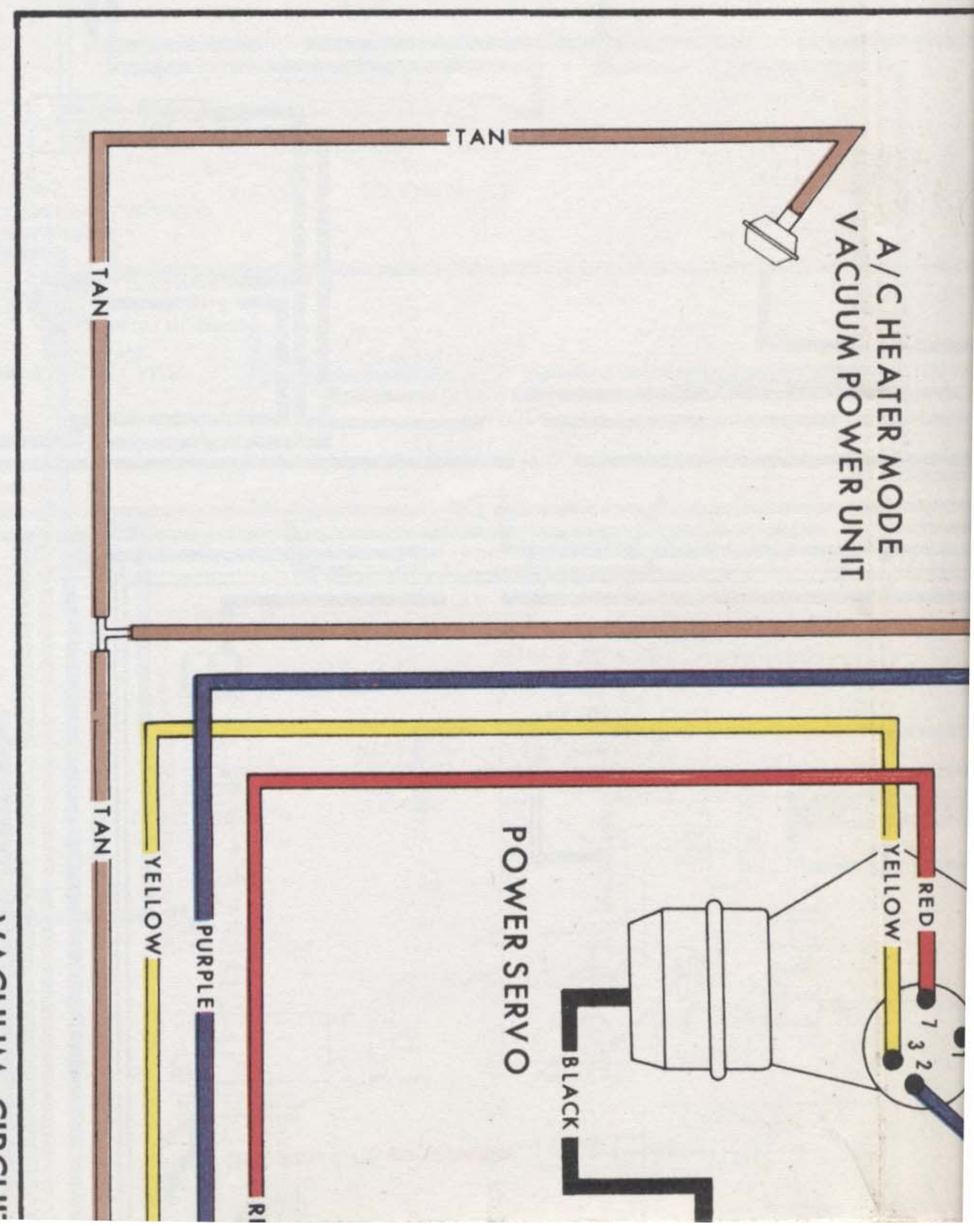

18B
ACCESSORY SWITCH GROUND
18B
ACCESSORY SWITCH ILLUMINATION
18GY
POWER ANTENNA
18P/W
RIGHTHAND COURTESY LAMP
FUSE BLOCK
18GY/B
10 R/W
18Y/B
18 DG
18 DG
18 DG
18-OR/B
16 DG
18BRN
4 AMP
INST. LPS
10 AMP
CRN-PRK
HAZARD FLASHER
15 AMP
HTR/AC
WDO BRKR
18 W
18 OR
PANEL HARNESS
AMPLIFIER
TRANSDUCER
.75Ω
1.20Ω


BLACK
TRACK-MASTER
RESTRICTION
CHECK VALVE
POWER BRAKE UNIT
PARKING BRAKE ASSEMBLY
RED
NEUTRAL SWITCH
BLACK
BLACK
BLACK
BLACK
BLACK
STEEL TUBING
VACUUM MOTOR
DELAY RESTRICTION
BLACK



ATC PROGRAMMER
TRANSDUCER
AMPLIFIER
FEED BACK POT
25Ω 40Ω 75Ω 120Ω
BLANK
10-OR/B
10T
18BRN
18Y/B
18LG/B
12B
BLANK
18LG
18Y
18B/W
18B/W
10ORB
18LBL
GROMMET
18 V
18 LG/B
18BRN
18 Y
18 B/W
18 B/W
10 OR/B
18 L BL
AUTO RELAY
18 Y
10 OR
18 B
10B/R
10-R
14 Y
BLACK
REAR A/C SYSTEM
FLEETWOOD SEVENTY-FIVE ONLY
CRUISE CONTROL
VACUUM RELEASE VALVE
HEAD VALVE
CHARTREUSE
DK. BROWN
RED
PURPLE
TAN
RED
YELLOW
A/C HEATER MODE
VACUUM POWER UNIT

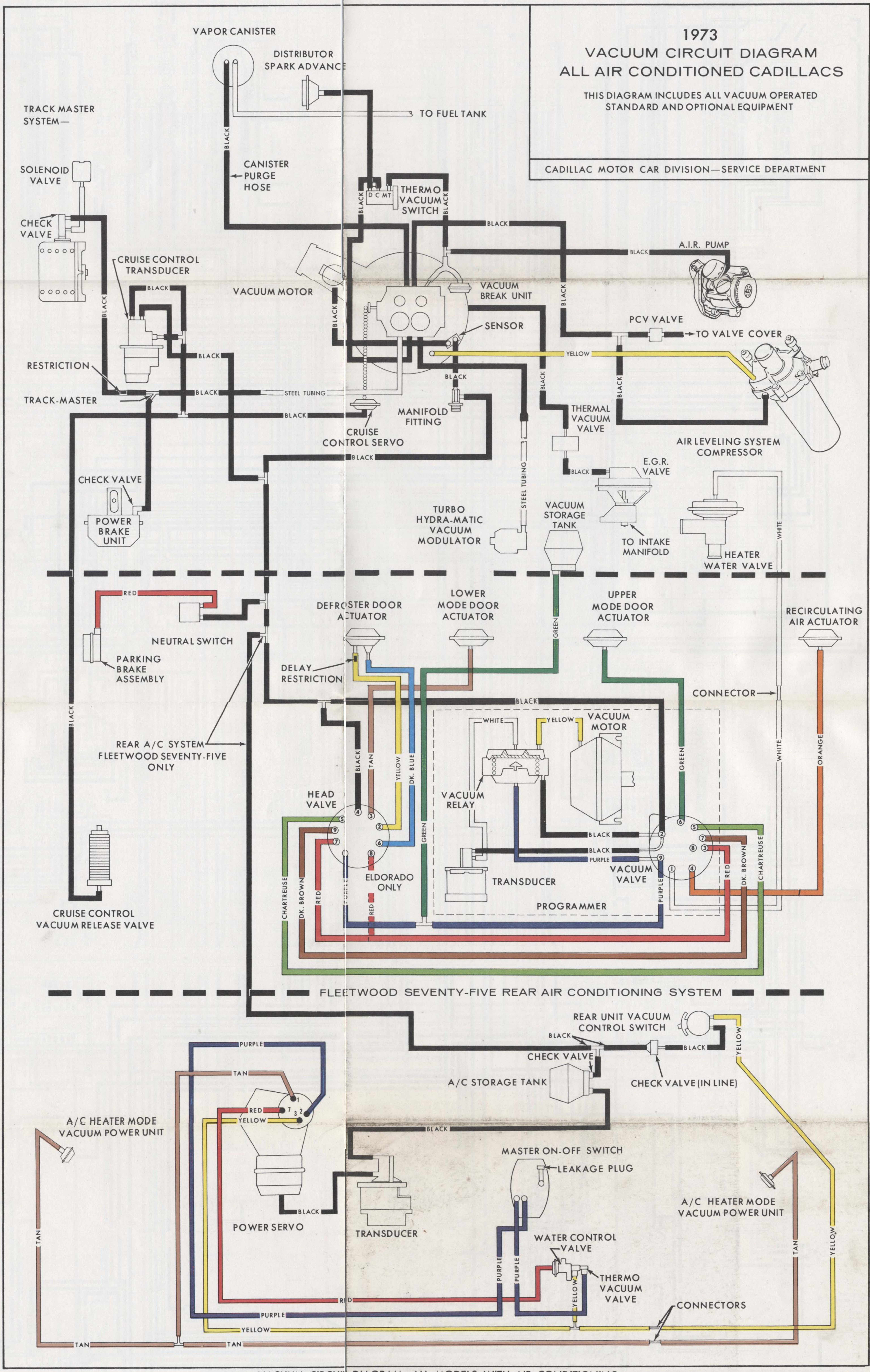

BATTERY
STARTER
16 BRN
18-OR
10-B
BAT
0-B
M
S R
12V
18DG
16B
16B
18Y
14Y
10-R
10-R
FUSIBLE LINKS
THERMAL FUSE
DIODE TRIO
REGULATOR
2
5
4
3
10-OR
18 Y
10 OR
12B/OR
18 B
10B/R
10-R
14 Y
Y


A/C HEATER MODE VACUUM POWER UNIT
TAN
TAN
TAN
YELLOW
PURPLE
POWER SERVO
RED
YELLOW
BLACK
VACUUM CIRCUI

1973 VACUUM CIRCUIT DIAGRAM ALL AIR CONDITIONED CADILLACS

THIS DIAGRAM INCLUDES ALL VACUUM OPERATED STANDARD AND OPTIONAL EQUIPMENT

CADILLAC MOTOR CAR DIVISION—SERVICE DEPARTMENT



VACUUM CIRCUIT DIAGRAM—ALL MODELS WITH AIR CONDITIONING

Changing rear springs is not hard, raise the rear of the car until shocks are fully extended, remove lower shock fasteners, raise car somemore until springs are fully extended and can be removed. CAUTION; you may have to remove the rear brake line from the center of the axle to prevent it from being overextended. My biggest problem was getting the car jacked up high enough!